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Proposed Action Memorandum for Hot Spot Soil Remediation at Rocky Flats Environmental Technology Site

January 1996

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PROPOSED ACTION MEMORANDUM
FOR HOT SPOT SOIL REMEDIATION AT
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

January 1996

ROCKY MOUNTAIN REMEDIATION SERVICES, L L C.
P O. Box 464
Golden, Colorado 80402-0464

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LIST OF ACRONYMS

µg/m3	micrograms per cubic meter
ARAR	Applicable or Relevant and Appropriate Requirements
BOM	Bill of Material
CAB	Citizens Advisory Board
CBOM	Construction Bill of Material
CC	Construction Coordinator
CCR	Colorado Code of Regulations
CDPHE	Colorado Department of Public Health & Environment
CE	Construction Engineer
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
CM	Construction Management
COC	Contaminants of Concern
D&D	Decontamination & Decommission
dB	decibels
DCG	Derived Concentration Guidelines
DOE	Department of Energy
DOE-RFFO	Department of Energy - Rocky Flats Field Office
DQO	Data Quality Objective
EA	Environmental Assessment
EIS	Environmental Impact Statement
EM	Environmental Management
EPA	Environmental Protection Agency
ER	Environmental Restoration
ERM	Environmental Restoration Management
FE	Facilities Engineering
FIDLER	Field Instrument for Detection of Low-Energy Radiation
FS/CMS	Feasibility Study/Corrective Measures Study
GRRASP	General Radiochemistry and Routine Analytical Services Protocol
H&S	Health and Safety
HQ	Hazard Quotient
HSP	Health and Safety Practices
HSWA	Hazardous and Solid Waste Amendments
HWA	Hazardous Waste Act
IAG	InterAgency Agreement
IDM	Investigative Derived Material
IH	Industrial Hygienist
IHSS	Individual Hazardous Substance Site
IM/IRA	Interim Measure/Interim Remedial Action
IWCP	Integrated Work Control Process
LFI	Limited Field Investigation

LIST OF ACRONYMS, (Continued)

LLM	Low-Level Mixed Waste
LLW	Low-Level Waste (radioactive)
MAC	Maintenance Action Center
NAAQS	National Ambient Air Quality Standards
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NFA	No Further Action
NTS	Nevada Test Site
OM	Operations Manager
OSHA	Occupational Safety and Health Act
OU	Operable Unit
OVA	Organic Vapor Analyzer
PA	Protected Area
PAC	Potential Area of Concern
PAM	Proposed Action Memorandum
PARCC	Precision, Accuracy, Representation, Completeness, and Comparability
PCB	Polychlorinated Biphenyl
PCOC	Potential Contaminants of Concern
PEA	Potential Early Action
PMT	Post-Maintenance Testing
PPCD	Plant for Prevention of Contaminant Dispersal
PPE	Personal Protective Equipment
PPRG	Programmatic Preliminary Remediation Goal
PRG	Preliminary Remediation Goal
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RE	Radiological Engineering
RFEDS	Rocky Flats Environmental Database System
RFETS	Rocky Flats Environmental Technology Site
RFI/CMS	RCRA Facility Investigation/Corrective Measures Study
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SDAF	Soil Disturbance Approval Form
SDEF	Soil Disturbance Evaluation Form
SOP	Standard Operating Procedure
SSDF	Site Survey Determination Form
SVR	Small Volume Removal
SWDA	Solid Waste Disposal Act
SWP	Standard Work Package
TAL	Target Analyte list
TSCA	Toxic Substances Control Act
UTL	Upper Tolerance Limits
UV	Ultraviolet (radiation)

LIST OF ACRONYMS, (Continued)

VOC	Volatile Organic Compound
WAC	Waste Acceptance Criteria
WEMS	Waste Environmental Management System
WCF	Work Control Form
WP	Work Package
WPCL	Work Package Change Log
WSRIC	Waste Stream Identification and Characterization

1.0 PURPOSE

This soil remediation action is proposed for implementation to remediate small volumes (less than 500 cubic yards) of contaminated soils (Hot Spots) at Rocky Flats Environmental Technology Site (RFETS) A hot spot is defined as a limited area of any contamination with a proposed preliminary remediation goal (PPRG) ratio of at least 100 (see Appendix B) Under this proposed action, the contaminated soils will be removed to cleanup standards agreed to by the Department of Energy (DOE), Environmental Protection Agency (EPA), and the Colorado Department of Public Health and Environment (CDPHE) The sites will be reestablished to achieve comparable conditions to the surrounding area with respect to concentration and habitat

2.0 PROCESS OVERVIEW AND BACKGROUND

This document creates a process for expedited cleanup or resolution of environmental concerns regarding soil contamination at RFETS Potential actions that may be taken under this Proposed Action Memorandum (PAM) are

1 Small Volume Removal (less than five cubic yards), or

2 Selective Excavation (greater than five but less than 500 cubic yards)

A methodology for the selection of candidate sites is presented In addition, there is a mechanism created for implementation of the remedial action, together with verification sampling and documentation of the action Each of these facets of the program is briefly described in this section

Potential candidate sites will be selected using the following criteria

- Adequacy of available, environmental data,
- Pre-remediation health and environmental risk,
- Potential for contaminant migration,
- Availability of soil storage, treatment, and disposal capacity,
- Compatibility with future Individual Hazardous Substance Site (IHSS) or Potential Area of Concern (PAC) site remedial actions,

- Implementability of the action described in this document,
- Effectiveness of the action, and
- Achievement of PPRGs

Sites remediated under the Soil Remediation PAM will be those that can be remediated with limited excavation Candidates for excavation under the Soil Remediation PAM will consist of areas with contaminated soil volumes of less than 500 cubic yards Confirmatory sampling will be performed in all excavations for verification that the action has met PAM cleanup standards

Selective excavations to be performed at each candidate site will be detailed in an Implementation Document The Implementation Document will contain a brief summary of the applicable environmental data, a recommended action, and an explanation of how the proposed action meets the criteria set forth in the PAM Final drawings, and specifications will also be included in the Implementation Document

Small volumes removals of contaminated soil may be excavated and disposed/stored without issuance of an Implementation Document or other form of regulatory approval These actions will be performed in accordance with procedures established in this PAM

Excavated materials will be placed in proper storage, for future treatment and/or disposal as appropriate Waste will be further dispositioned in the Implementation Plan To the maximum extent practicable, these actions will meet ARARs, but they are not necessarily the final actions for remediation of the IHSSs

A Completion Report will be prepared for each action (including small volume removals) after all work is complete and the confirmatory sampling data have been validated The report will consist of a brief description of the work performed, confirmatory sampling conducted, analytical results and deviations from the Implementation Document DOE will prepare monthly progress reports to keep EPA, CDPHE, RFETS representatives, and the public apprised of progress in implementing the PAM

3.0 PROJECT APPROACH

This section provides a discussion of the two alternatives that are considered under the Soil Remediation PAM, namely

- Small Volume Removal, and
- Selective Excavation

3 1 SMALL VOLUME REMOVAL

Small volumes of contaminated materials may be excavated without issuance of separate Implementation Documents or other form of DOE, regulatory or public approval Small volume

removals are defined as soil quantities less than five cubic yards However, an updated list of all planned and completed Small Volume Removals (SVR) will be provided quarterly to the EPA, CDPHE, and Public document centers

The intent of the small volume exclusion is to expedite the removal of small volumes of soils without delays imposed by the review process It is presumed that these actions will

- Be consistent with the selected final remedy,
- Protect human health and the environment,
- Be cost effective, and
- Significantly reduce the volume, toxicity, or mobility of contaminants

All SVRs will comply to the extent practicable with ARARs or PPRGs

Excavation, field verification methods, and backfill requirements as described in Section 3 2 will be followed Excavated materials may be placed in drums, crates, or smaller roll-off containers Excavated materials will be transported and stored on site as specified in Section 3 3

A Completion Report will be issued for each SVR action However, a combined report including multiple SVR actions may also be provided Verification sampling will be completed in accordance with sampling and analysis requirements

3 2 SELECTIVE EXCAVATION

Candidates for excavation under the Soil Remediation PAM will be areas with contaminated soil volumes that can be remediated without the use of in-situ treatment (e g , soil vapor extraction, and in-situ stabilization) A 500 cubic yard excavation limit has been selected as the practical maximum volume that can be excavated without considering a broader range of alternative remedial actions

The depth of excavation will generally not exceed 4 feet This depth has been selected as the maximum excavation depth because it is very unlikely that humans or biota would be exposed to soil contaminants located beneath 4 feet of clean fill This document is limited to hot spots, so if contamination exceeds small amounts (greater than 500 cubic yards), the action required must be reconsidered Also, shoring and confined space entry requirements are imposed at a depth of 4 feet These requirements would add significant cost and increase execution times for each action Other site-specific conditions may also limit excavation depths, such as the presence of critical

utilities or saturated soils Under some circumstances, it may be desirable to excavate beyond four feet

The bulk of the soils will be excavated using mechanical equipment Some hand excavation may also be required Excavated soils will be placed in either metal roll-off containers, half-crates, full-crates, or drums Containers will be sealed when full Excavated materials will be transported and stored on site as discussed in Section 3 3

Excavation will be performed in accordance with procedures described in Standard Operating Procedure (SOP) number 5-21000-OPS-GT 24 This includes requirements for monitoring and control of dust (SOP FO 1), general equipment decontamination (SOP FO 3), and heavy equipment decontamination (SOP FO 4) In addition, SOP GT 24 requires approvals from appropriate plant operations, particularly Facilities Engineering (FE) which provides utility clearances General Radiochemistry and Routine Analytical Services Protocol (GRRASP) will be adhered to during sample analysis

During the excavation process, field tests for radioactivity and/or volatile organic compound(s) content (as appropriate) will be performed for every foot of depth of excavation

- Gamma and low energy x-ray radiation will be evaluated using a Bicron Field Instrument for the Detection of Low-Energy Radiation (FIDLER)
- Alpha and beta/gamma surveys
- Organic content will be determined based on headspace analyses of bagged samples Measurements will be made using either a photoionization (PID) detector or a flame ionization detector (FID) as appropriate
- Additional real-time analyses for contaminants may be used as necessary to delineate the extent of contamination

In addition, the soils exposed in the excavation will be visually described and logged
When the field screening tests indicate that either sufficient soil has been excavated or the depth or volume limitations have been reached, confirmatory samples will be collected for laboratory analysis A Completion Report will be issued for each soil removal action

3 3 WASTE MANAGEMENT

This section discusses in general terms the Rocky Flats Plant Field Operation Procedures applicable to managing wastes generated during the implementation of a Soil Remediation PAM Additional procedures may require development depending on type of containerization and disposal location These procedures will be included in the Implementation Plan The site manager will be responsible for adhering to these procedures and, in general, the proper handling of all materials generated during soil remediation PAMs This section discusses the handling of the generated waste, waste storage/disposal options, and managing field decontamination wastes

3 3 1 HANDLING OF WASTE GENERATED BY SOIL REMEDIATION PAM ACTIONS

The contaminated soil (containing low-level radioactive, low-level mixed, or hazardous materials) removed from the IHSS or hot spot during the PAM action will be containerized at the site in drums (either 55-gallon or 30-gallon), in half or full crates, or large capacity roll-off containers depending on the expected volume of contaminated soil The intent will be to minimize the number of containers The RFETS waste management procedures will be adhered to at all times

Before soils are excavated, the site team will secure the necessary drums or containers to store the soils The site team will receive the drums or containers from Rocky Mountain Remediation Services (RMRS) Remediation Support and a unique Waste Environmental Management System (WEMS) identifying number will accompany each drum or container The site team will use this number to track each drum or container on a Field Log Form until it is returned to RMRS

Once a drum or container is filled, it will be sealed and a temporary sample custody seal will be placed on it The site team will then mark each drum or container with proper locational information, depth of material in container, and date it was filled This information will also be recorded on the Field Log Form along with sample number(s) of samples taken from the container and electronically transfer drum fill data to RFEDS The containers will then be transported to a storage area

The site team will present copies of the completed Field Log Forms and other required documentation to the receiving RMRS Waste Operations or Waste Management personnel The receiving RMRS personnel will inspect the drums or containers and if they pass inspection, the RMRS personnel will sign the forms and relieve the site team of the responsibility for the drums

If any miscellaneous waste are encountered, they will be managed, recycled, treated and/ or disposed in accordance with the Federal, State and local laws and regulations, and RFETS policies and procedures

3 3 2 STORAGE/DISPOSAL OPTIONS FOR WASTE FROM SOIL EXCAVATION PAMS

The options for disposing of the contaminated soils removed during PAM activities will depend on whether the waste is characterized as hazardous, low-level radioactive, or low-level mixed waste Contaminated soils characterized as hazardous waste will be transported off site for disposal in accordance with Waste Management procedures F O 23 (Management of Soil and Sediment) The Sampling and Analysis Plan (SAP) requirements will be specified in the Implementation Plan

3 3 3 MANAGING FIELD DECONTAMINATION WASTES

The site team will reduce the contamination of equipment and container surfaces in the field in an effort to reduce overall contamination before these items are moved from the work site To accomplish this decontamination, the site team will follow all applicable procedures, including documentation requirements, as specified in Field Operation Procedure FO 3 - General Equipment Decontamination and Field Operation Procedure FO 4 - Heavy Equipment Decontamination

The site team will follow the procedures specified in Field Operation Procedure FO 7 - Handling of Decontamination Water and Wash Water to properly dispose of any water generated during field decontamination activities In general, the site team will contain decontamination water in tanks The site team will properly dispose of decontamination water per established plant procedures

The site team will dispose of potentially contaminated personal protective equipment (PPE) in accordance with Field Operation Procedure FO 6 - Handling of PPE In general, PPE will be double-bagged in 3-mil plastic bags and these bags will be transported to the RMRS Remediation Support Group for disposal

4 0 CRITERIA FOR REMEDY SELECTION

As discussed in the introduction to this document, potential candidate sites will be selected using the following criteria

- Adequacy of available, environmental data,
- Health and environmental risk,
- Potential for contaminant migration,
- Availability of soil storage, treatment, and disposal capacity,
- Compatibility with future IHSS remedial actions,
- Implementability of the action described in this PAM,
- Ease of implementation or feasibility,
- Effectiveness of the action, and
- Achievement of Applicable or Relevant and Appropriate Requirements (ARARs)

Thus, the selection of hot spots for inclusion in this PAM process depends on the availability of site data, operational and remedial design constraints, and an approved list of ARARs or PPRGs The following sections discuss site data needs and their remedy selection implications

4 1 BASIC DATA REQUIREMENTS

In order for a hot spot to be considered for possible early action under this PAM process, there must be sufficient, environmental data to understand the nature and extent of contamination, the current health and environmental risks and the potential for contaminant migration Data sufficiency is a problematic issue Therefore, a team of environmental professionals including representatives from the agencies will need to assess current data against data needs and assess data adequacy

4 2 EXCAVATION

Contaminated soil will be removed only if sufficient data are available to understand the nature and extent of contamination, the current health and environmental risks and the potential for contaminant migration Real-time field analytical techniques may be used to supplement

understanding of the nature and extent of contamination prior to, and during remedial actions In addition, the action must meet the following criteria

1 The action must be protective of human health and the environment,

2 The action must reduce current or potential risk with a goal of obtaining the PPRG ratio equal to or less than 10^{-4} cancer risk, and/or background levels

3 The action must be consistent with, or must not interfere with the final action,

4 The action must be consistent with, or must not interfere with current plant activities,

5 The action must be implementable using the plans, specifications and procedures described in this PAM with little or no modification, and

6 The action must be feasible after considering all of the above

There are also numerous site and contaminant specific factors which will influence the selection of the removal remedies Each of the remedies is discussed below

Small Volume Removal

Small volume removal actions will only be undertaken for contaminated soil volumes of less than five cubic yards and that do not involve removal of soil from the saturated zone In addition, the contaminants must not pose an extreme threat to worker safety during the removal action

Selective Excavation

Contaminated soils will be removed by excavation if the total volume of excavated material is anticipated to be less than 500 cubic yards Removal actions may be reconsidered if depth of contamination is 4 feet or more, [Occupational Safety and Health Act (OSHA)] shoring and confined entry procedures are required, the area has a large population of burrowing animals, the contaminated soils appear to be an active source of ground-water contamination, or if the

contaminants are likely to degrade naturally into less hazardous compounds in the surficial or subsurface environment

4 3 REMEDY SELECTION PROCESS

The selection of an action for a specific hot spot will be presented in the Implementation Document The procedure used will be based on the criteria and requirements included in this PAM as described below

1 Determine if data requirements are met

The basic data requirements are described in Section 4 1 These requirements must be satisfied before a hot spot can be considered for inclusion in the Soils Remediation PAM Additional field investigations may be required if the available data are not adequate

2 Determine if action is appropriate under this Soil Remediation PAM

In order for an action to be taken under this PAM, the following requirements must be met

a) The action will reduce risk and be
- protective of public health and the environment, and
- performed without significant risk to workers, plant site personnel, or the general public

b) The action to be performed
- can be achieved in accordance with applicable standard plant procedures,
- can be achieved using the plans and specifications referred to in this PAM,
- does not involve in-situ treatment, i e , solidification, soil washing, etc , and
- does not require more than 500 cubic yards of contaminated soil to be excavated

c) The action does not significantly interfere with
- current plant activities, or
- potential final remediation

d) The action will meet the PPRGs and/ or acceptable risk-based levels included in this PAM

If an action is appropriate based on the above criteria, and the contaminated soil volume is less than five cubic yards, the action will be performed as described in this document without issuance of an Implementation Document

5.0 POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) AND TO-BE-CONSIDERED GUIDANCE (TBCs)

This section contains potential ARARs and TBCs for the RFETS Soil Remediation PAM A summary of the ARARs and TBCs is included in Appendix A

5 1 INTRODUCTION

In accordance with the IAG, an objective of accelerated actions at RFETS is the identification and compliance with federal and state ARARs and other TBC criteria that are associated with this proposed action There are three types of ARARs (1) chemical-specific, (2) location-specific, and (3) action-specific

5 2 AMBIENT OR CHEMICAL-SPECIFIC ARARS

Chemical-specific ARARs set concentration limits for soil, groundwater, or surface water for specific pollutants There are no chemical-specific ARARs for soil, however, there are some guidance documents which can be used as TBCs for soils For example, the USEPA Office of Solid Waste and Emergency Response (OSWER) published guidance (Directive 9347-09FS) specific to delisting hazardous waste There are about 30 chemicals in this guidance with a de minimus concentration for each which can be used as a TBC clean-up level In addition, the Toxic Substances Control Act (TSCA) is a source for TBC's when dealing with Polychlorinated Biphenyl's (PCB's), and DOE orders list the TBC's for radionuclides Approved site-specific PPRGs can also be used as TBC clean up levels and are included in Appendix B

5 3 LOCATION-SPECIFIC ARARS

Location-specific ARARs are regulations that set restrictions on activities or contaminant levels based on unique characteristics of the site The provisions of 40 CFR 6 302(a) and (b) regarding construction that would have an adverse impact on wetlands or within a flood plain, the Endangered Species Act (16 USC 1531 et seq), the Migratory Bird Treaty Act (16 USC 703 et seq), the Bald Eagle Protection Act (16 USC 688 et seq) and dredged or fill material into waters of the US (40 CFR 230) are all considered relevant and appropriate to this Soil Remediation PAM Based upon where the potential soil removals will occur, DOE believes that there will be no adverse impact on wetlands from the soil removals However, coordination will be maintained with the U S Fish and Wildlife Service to minimize such adverse wildlife impact, including threatened or endangered species or their habitats, from implementation of the Soil Remediation PAM

5 4 ACTION-SPECIFIC ARARS

The action-specific ARARs set controls or restrictions on particular kinds of activities related to management of hazardous substances or pollutants Specifically, regulations pertaining to air, landfill disposal restrictions, wetlands, wildlife and radioactive wastes were reviewed The Atomic Energy Act and the Occupational Safety and Health Act (OSHA) were reviewed as TBC material[1]

Air

In the context of this PAM, there is a very remote chance of any release of volatiles, semivolatiles, metals or radionuclides other than fugitive emissions Even if such a release did occur, it would only be minimal and of very brief duration Any potential air emissions will be dealt with in the Health & Safety Practices (HSP) document

Land Disposal Restrictions and Removal of Soil

Material determined to be hazardous waste are subject to substantive State and Federal provisions for their management These substantive provisions include but are not limited to 40 CFR Part 262 (Standards Applicable to Generators of Hazardous Waste), 40 CFR Part 263 (Standards Applicable to Transporters of Hazardous Waste) and 40 CFR Part 264 (Standards for Owners and Operators of Hazardous Waste) These provisions are also covered in the Colorado Hazardous Waste Act (CRS 25-15-101 to 313) The Colorado Hazardous Waste Act contains guidelines and requirements for hazardous waste disposal sites Not all soil removals will involve "hazardous waste" The potential ARARs will be reviewed in the Implementation Document for each removal under this PAM before the removal occurs

[1]The RFP is not NRC-licensed and regulated and, therefore, Atomic Energy Act regulations are designated as TBC In addition, worker protection under OSHA is not considered an ARAR under Comprehensive Environmental Response Compensation and Liability Act (CERCLA)

The Land Ban regulations (40 CFR 268) are a direct result of the Hazardous and Solid Waste Amendments (HSWA) of 1984 For each hazardous waste, EPA establishes treatment standards that are protective of human health and the environment when the wastes are land disposed Land disposal includes placement in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome or salt bed formation, underground mine or cave, or concrete vault or bunker The Land Ban regulations were reviewed and determined to be applicable and relevant and appropriate for any excavated soil that will be sent off site for disposal[2]

Wetlands and Wildlife

DOE does not believe that any wetlands could be adversely affected by the Soil Remediation PAM However, until a final design for each removal is selected, it cannot be definitively determined that no impact on wetlands will occur If the final site selection and/or design results in an impact on wetlands, the DOE will review the regulatory provisions concerning wetlands impact and other appropriate guidance, and will proceed in a manner consistent with those provisions There are no action-specific regulations for wetlands, however, location-specific regulations are mentioned in Section 5 3 The Colorado Wildlife Enforcement and Penalties (CRS 33-1-101 et seq), which prohibits actions detrimental to wildlife, is relevant and appropriate Coordination will be maintained throughout the project with the U S Fish and Wildlife Service concerning any potential impacts on wetlands or wildlife

[2]In addition, USEPA's proposed rule on Hazardous Soil (58 FR 48092) was reviewed This rule proposed the regulatory framework for treatment of soil containing characteristic or listed waste in accordance with the land disposal requirements This rule will be finalized in the Hazardous Waste Identification Rule due to be published in October 1994 and will have an impact on compliance with the land disposal restrictions

Radioactive Wastes

The Atomic Energy Act (CFR Title 10 Article 20) outlines provisions, requirements, and standards in the management of radioactive materials Colorado State Radiation Control (CRS §25-11 Parts 1 and 2, and 6 CCR 1007-1) provides provisions and outlines state requirements in the management of radioactive materials and radioactive waste 6 CCR 1007-1 Part 14 establishes the requirements for land disposal of low-level radioactive wastes, and Part 15 identifies the standards for low-level radioactive wastes DOE provides guidance in the management of radioactive wastes from generation to disposal All of these are relevant and appropriate

5 5 DEPARTMENT OF ENERGY ORDERS

The DOE orders are not promulgated requirements and are TBCs potential ARARs (EPA, 1989) The orders have been developed for internal DOE use and are not subjected to public review and comment before issuance The following orders incorporate guideline concentrations for chemicals and radionuclides

DOE Order 5400.1 "General Environmental Protection Program"

DOE Order 5400 1 establishes DOE's environmental protection program requirements for compliance with applicable Federal, State and local environmental laws, regulations, and policies This Order details the mandatory environmental protection standards that DOE will follow at all facilities These standards are referenced in this document as appropriate for the proposed interim actions

DOE Order 5400 5 "Radiation Protection of the Public and the Environment"

The DOE Directive 5400 5 (DOE, 1990) establishes broad standards and requirements designed to protect the public and environment against undue risk from radiation released from routine DOE activities and remedial actions The following radiation exposure limits have been defined for members of the public

- an effective dose equivalent of less than 100 millirem/year (all exposure pathways considered),
- an effective dose of less than 4 millirem/year (only the drinking water pathway considered), and

The directive includes derived concentration guidelines (DCGs) for discharges of radioactively contaminated liquids to surface waters, aquifers, soil and sanitary sewerage systems Chapter VI "Residual Radioactive Material" sets the requirements and guidelines for the cleanup and management of residual radioactive materials in soils DOE 5400 5 will be considered in the Soil Remediation PAM[3]

DOE 5820 2A "Radioactive Waste Management"

This order establishes policies, guidelines and requirements for managing DOE radioactively contaminated waste (e g , transuranic and low level waste) starting with its generation and continuing through disposal The requirements of this order are applicable to any radioactively contaminated waste, which, for the purpose of this document, would be generated from soil excavation under this PAM involving radioactively contaminated soil

5 6 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

The intent of NEPA is to ensure the consideration of the widest possible range of beneficial uses of the environment with the goal of protecting the human environment and will absolutely be adhered to by all Soil Remediation PAM actions

All hot spot removals are expected to be covered by the most relevant categorical exclusion that is applicable to Soil Remediation PAM actions which is as follows

[3]Currently, in order to determine if a waste is radioactively contaminated for disposal purposes (either on site or off site), the material must first have a radiological evaluation performed in accordance with the No-Radioactivity-Added (NRA) program

> Removal actions under Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (including those taken as final response actions and those taken before remedial action) and removal-type actions similar in scope under RCRA including treatment, recovery, storage, or disposal of wastes at existing facilities Actions include, but are not limited to (a) capping or other containment of contaminated soils or sludges if the capping or containment would not affect future groundwater remediation and if needed to reduce migration of hazardous substances, pollutants, contaminants into soil, groundwater, surface water or air, and (b) excavation or consolidation of contaminated soils or materials from drainage channels, retention basins, ponds, and spill areas if such actions would reduce the spread of, or direct contact with, the contamination (10 CFR Part 1021, Sub part D, Appendix B)

Any removal that meets any of the following conditions, will not be addressed by this PAM

- It is "connected" to other actions with potentially significant impacts, or is related to other proposed actions with cumulatively significant impacts (10 CFR 1021 410)
- It requires sighting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (10 CFR 1021, Sub part D, Appendix B) The Accelerated Cleanup Program at Rocky Flats is predicated on the construction or possible expansion of waste storage facilities, however, the Soil Remediation PAM actions alone are not the cause for these expansion plans Regardless, incorporated into the planning process for constructing a waste storage facility is the explicit consideration of NEPA requirements for such a project
- It adversely affects environmentally sensitive resources such as threatened or endangered species, or floodplains or wetlands (10 CFR 1021, Sub part D, Appendix B)

Regular communication will be maintained with the DOE-RFFO NEPA Coordinator to maintain the eligibility of Soil Remediation PAM actions for the categorical exclusion

6 0 RISK EVALUATION METHODOLOGY

Hot spots are defined as defined a limited area of contamination with a proposed preliminary remediation goal (PPRG) ratio of at least 100 Therefore, these small areas that have PPRGs that exceed a ratio of 100 will define the area to be removed

Programmatic risk-based PPRGs have been developed by DOE which will be considered in establishing initial sitewide cleanup targets These PPRGs are provided in Appendix B

7 0 IMPLEMENTATION SCHEDULE

The removal of contaminated soils in the identified hot spot area (selective excavation) will be complete within six months of approval of the Inplementation Plan Small volume removals are to be carried out without issuance of an Implementation Document In each case, completion reports will be issued within six months of the action Any delays, scope or budget changes may affect the project duration

8 0 REFERENCES

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Appendix A

Federal and State Applicable or Relevant and Appropriate Requirements (ARARs)

TABLE 1 - DRAFT MASTER LIST OF POTENTIAL FEDERAL AND STATE ARARs FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
ATOMIC ENERGY ACT (AEA) [42 USC 2200 et. seq.]			
RADIATION PROTECTION OF THE PUBLIC AND THE ENVIRONMENT • Radiation Protection Standard - All Pathways • Radiation Protection Standard - Airborne Emissions • Radiation Protection Standard - TRU Waste Storage/Disposal • ALARA Process • Effluent Discharges to Surface Waters • Effluent Discharges to Sanitary Sewer Systems • Residual Radioactivity Levels (Real Property, Materials, and Equipment) • Monitoring and Surveillance	DOE Order 5400 5 {10 CFR 834, Proposed} Chapter II 1a and III {834 101} Chapter II 1b {834 102} Chapter II 1c {834 109} Chapter II 2 {834 11} Chapter II 3a {834 201} Chapter II 3d {834 203} Chapter II 5 and IV {834, Subpart D} Chapter II 6 {834 10}	TBC	This DOE Order establishes criteria for the protection of human health and the environment to ensure radiation exposure resulting from DOE activities does not exceed an effective equivalent dose for 100 mrem per year This radiation dose limit also forms the basis for the release of radionuclides to the environment and the release of properties for unrestricted use
RADIATION PROTECTION OF THE PUBLIC • Radiation Protection Standard - All Pathways • Effluent Discharges to Sanitary Sewer Systems • Treatment or Disposal by Incineration • Disposal of Specific Waste	10 CFR 20 1301 2003 2004 2005	TBC	For onsite response actions, NRC requirements are not applicable to CERCLA activities conducted at the RFETS, DOE is required to and has established programs to manage radioactive operations and waste Although NRC regulations may be relevant, these NRC standards are not considered to be appropriate if DOE Orders adequately establish standards of control for the management of radioactive materials to ensure protection of human health and the environment In cases where a DOE Order specifies requirements that are inconsistent with NRC standards, the DOE requirement will be followed unless specifically waived by DOE in order to adopt the NRC standard
RULES AND REGULATIONS PERTAINING TO RADIATION CONTROL • Permissible Levels of Radioactive Material in Uncontrolled Areas	6 CCR 1007-1, Part 4 4.60.1	TBC	

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Requirement	Citation	Type	Comment
ATOMIC ENERGY ACT (AEA) [42 USC 2200 et. seq.]			
RADIOACTIVE WASTE MANAGEMENT • Management of Transuranic Waste - Temporary Storage at Generating Sites • Management of Low-Level Waste - Perfomance Objectives - Performance Assessment - Waste Characterization - Disposal - Disposal Site Closure/Post Closure - Environmental Monitoring	DOE Order 5280 2A Chapter II 3e~~(4) to 3e(7)~~ Chapter III 3a 3b 3e~~(5)~~ 3i 3j 3k	TBC	
ENVIRONMENTAL RADIATION PROTECTION STANDARDS FOR MANAGEMENT AND DISPOSAL OF SPENT NUCLEAR FUEL, HIGH-LEVEL AND TRANSURANIC RADIOACTIVE WASTES • Radiation Dose Standard	40 CFR 191 03~~(b)~~	C	Standard applies to transuranic wastes only
~~OCCUPATIONAL RADIATION PROTECTION~~	~~10 CFR 835~~	~~C/A~~	

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C - Chemical-Specific ARAR
L - Location- Specific ARAR
TBC To Be Considered

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Requirement	Citation	Type	Comment
ATOMIC ENERGY ACT (AEA) [42 USC 2200 et. seq.]			
LICENSING REQUIREMENTS FOR LAND DISPOSAL OF RADIOACTIVE WASTE • Radiation Protection • Access Restrictions • Future Impacts • Site Siting/Stability • Drainage Controls/Floodplains • Final Cover • Buffer Zone • Ground Water Monitoring • Waste Disposal Requirements	10 CFR 61 41 & 52~~(a)(6)~~ 42 50~~(a)(2),(3) & (11)~~ ~~50(a)(4), (7), (8), (9), & (10)~~ ~~50(a)(5), (6), &~~ 51~~(a)(4), (5), (6), (9), & (10)~~ ~~51(a)(1) &~~ 52~~(a)(2)~~ ~~52(a)(8) &~~ 53~~(d)~~ ~~53~~ 55, 56~~, & 52(a)(11)~~	TBC	

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TBC To Be Considered

TABLE 1 - DRAFT MASTER LIST OF POTENTIAL FEDERAL AND STATE ARARs FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
CLEAN AIR ACT (CAA) [42 USC 7401 et. seq.]			
AMBIENT AIR QUALITY STANDARDS • Sulfur Dioxide • Particulate Matter (PM10) • Carbon Monoxide • Ozone • Nitrogen Dioxide • Lead • Total Suspended Particulates	5 CCR 1001-14 [40 CFR 50]	C	Ambient air quality standards are considered to be chemical- specific ARARs to assess the quality of ambient air and the need to remediate a particular IHSS to maintain the quality of the ambient air RFETS is located in a non-attainment zone for particulate matter and ozone Ambient air quality standards are not effluent discharge limitations, they are used in conjunction with air dispersion modeling to establish discharge limits that are protective of air quality

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C - Chemical-Specific ARAR
L - Location- Specific ARAR
TBC To Be Considered

TABLE 1 - DRAFT MASTER LIST OF POTENTIAL FEDERAL AND STATE ARARs FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
CLEAN AIR ACT (CAA) [42 USC 7401 et. seq.]			
COLORADO AIR POLLUTION REGULATIONS	5 CCR 1001 [40 CFR 52, Subpart G]		Regulation No 1, Section III D(2)(b), (e), (f), and (h) requires control measurements to be implemented for construction activities, haul roads, haul trucks, and demolition activities, respectively, to prevent the emission of fugitive particulates in excess of air standards Other portions of Regulation No 1 would be an ARAR only if the remedial action involves the specific emission source regulated Regulation No 2 prohibits odorous air contaminants from any single source to be emitted in detectable odors which are measured in excess of the air standards Regulation Nos 6, 7, 8, and 15 would be an ARAR only if the remedial action involves the specific emission source regulated
• Emission Control Regulations for Particulates, Smokes, Carbon Monoxide, and Sulfur Oxides - Particulates - Emission Monitoring Requirements for Existing Sources - Sulfur Dioxide Emission Regulations	Regulation No 1 [5 CCR 1001-3]	A	
• Odor Emissions	Regulation No 2 [5 CCR 1001-4]		
• Air Contaminant Emissions Notices	Regulation No. 3 [5 CCR 1001-5]		
• Standards of Performance for New Stationary Sources	Regulation No 6 [5 CCR 1001-8]		
• Emissions of Volatile Organic Compounds	Regulation No 7 [5 CCR 1001-9]		
• Control of Hazardous Air Pollutants	Regulation No 8 [5 CCR 1001-10]		
• Emissions of Ozone-Depleting Compounds	Regulation No 15 [5 CCR 1001-19]		

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Requirement	Citation	Type	Comment
CLEAN AIR ACT (CAA) [42 USC 7401 et. seq.]			
NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS			Demonstration of compliance with 40 CFR 61 92 is performed on a sitewide basis taking into consideration all RFETS sources Stack monitoring is required for all release points which could contribute greater than 0 1 mrem/yr
• National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities	40 CFR 61, Subpart H		
- Standard	92		~~40 CFR 61 192 was developed primarily for UMTRA sites Application of the standard to the container storage of waste within structures is questionable~~
- Emission Monitoring and Test Procedures	93		
- Compliance and Reporting	94	C/A	
• National Emission Standards for Radon Emissions from Department of Energy Facilities	40 CFR 61, Subpart Q		
- Standard	192		
- Exemption from the Reporting and Testing Requirements of 40 CFR 61 10	193		

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TBC To Be Considered

TABLE 1 - DRAFT MASTER LIST OF POTENTIAL FEDERAL AND STATE ARARs FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
FEDERAL WATER POLLUTION CONTROL ACT {aka Clean Water Act (CWA)} [33 USC 1251 et. seq.]			
WATER QUALITY CRITERIA - GOLD BOOK	33 USC 1314 (CWA Section 304)	C	The "Gold Book" presents guidelines with respect to water quality criteria for toxic pollutants Criteria are published for aquatic and human health The water quality criteria are not promulgated standards, however, they are established guidelines used for developing NPDES permits and may be considered potentially relevant and appropriate WQC should not be used as effluent limits, rather discharge limits should be established either through the NPDES or UIC permitting process Although water criteria are non-promulgated and non-enforceable standards, Section 121(d)(2)(B)(i) of CERCLA as implemented by the NCP (40 CFR 300 430(e)(2)(i)(E)) specifies that WQC established under Sections 303 and 304 of the CWA shall be attained where relevant and appropriate under the circumstances of the release The designated or potential use of the surface or ground water, the environmental media affected, the purpose for which the WQC were developed, and the latest information are to be considered in determining the relevance and appropriateness of the WQC to the response action Therefore, the need to comply with WQC as a relevant and appropriate requirement needs to be determined on a case-by-case basis using the factors listed above

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TBC To Be Considered

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Requirement	Citation	Type	Comment
FEDERAL WATER POLLUTION CONTROL ACT {aka Clean Water Act (CWA)} [33 USC 1251 et. seq.]			
COLORADO BASIC STANDARDS AND METHODOLOGIES FOR SURFACE WATER • Antidegradation Rule • Water Quality-Based Designations • Basic Standards Applicable to Surface Waters of the State - Descriptive Standards for Substances from Point and Nonpoint Sources - Standards for Radioactive Materials - Standards for Organics • Salinity and Suspended Solids • State Use Classifications - Classifications - Areas Requiring Special Protection • Testing Procedures - Introduction - Numeric Levels - Standard Test Procedures - Bioassay Procedures	5 CCR 1002-8 3 1 8, ~~(2)~~ 3 1 11, ~~(1)~~ ~~3 1 11, (2)~~ ~~3 1 11, (3)~~ 3 1 12 3 1 13, ~~(1)~~ ~~3 1 13, (3)~~ 3 1 16, ~~(1)~~ ~~3 1 16, (2)(a)~~ ~~3 1 16, (2)(b)~~	C	~~The statewide and site specific surface water standards, and the standards associated with the site specific use classifications, will be considered potential ARARs, except standards not associated with a use classification and AEA regulated radionuclides.~~ Non-AEA ~~radionuclides that have Statewide surface water standards will be considered potential ARARs.~~ Site-specific standards not associated with a use classification and AEA regulated radionuclides are not ARARs because they do not meet the criteria of "general applicability" and/or enforceability in 40 CFR 300 400(g)(4) and are, therefore, not "promulgated " When permanent structures are put in place so that surface waters from RFETS no longer flow into, or have the potential to flow into, immediate downstream drinking water supplies, ~~then the existing domestic use classification would not be considered relevant or appropriate.~~ DOE ~~also~~ intends to file a petition with the Colorado Water Quality Control Commission to change the use classification. ~~when these structures are emplaced. DOE has identified the downgradient RFETS boundary as the point of compliance.~~

A - Action-Specific ARAR
C - Chemical-Specific ARAR
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TBC To Be Considered

TABLE 1 - DRAFT MASTER LIST OF POTENTIAL FEDERAL AND STATE ARARs FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
FEDERAL WATER POLLUTION CONTROL ACT {aka Clean Water Act (CWA)} [33 USC 1251 et. seq.]			
COLORADO BASIC STANDARDS FOR GROUND WATER • Classifications of Ground Water - Ground Water Classifications - Criteria Used to Identify Classifications for Ground Water - Specified Area • Ground Water Quality Standards - Narrative Standards - Numerical Standards - Statewide Standards • Point of Compliance	5 CCR 1002-8, 3 11 4 ~~(a)~~ ~~3 11 4 (b)~~ ~~3 11 4 (c)~~ 3 11 5 ~~(a)~~ ~~3 11 5 (b)~~ ~~3 11 5 (c)~~ 3 11 6 ~~(a) to (e)~~	C	Despite questions about enforceability, the Statewide ground water standards will be considered potential ARARs, except standards for AEA regulated radionuclides ~~DOE has identified the downgradient RFETS boundary as the point of compliance.~~ The Colorado site-specific ground water use classifications, and their associated standards, (5 CCR 1002-8, Section 3 12 7) are not considered to be ARARs because those standards and associated use classifications have not been applied or developed consistently throughout the State Thus the standards fail the National Contingency Plan criteria of "general applicability" in 40 CFR 300 400(g)(4) and are, therefore, not "promulgated " Also, site-specific standards for atrazine and simazine, and Statewide and site-specific standards for AEA regulated radionuclides, are not considered to be ARARs because they do not meet the general applicability/promulgated test and/or enforceability criteria RFETS is the only industrial site in Colorado that has the State ground water use classifications of domestic use quality, agricultural use quality and surface water protection imposed upon a specific site (5 CCR 1002-8, Section 3 12 7) As the standards do not apply to any others, they are not "generally applicable" and therefore should not be used as ARARs
TOXIC POLLUTANT EFFLUENT STANDARDS • Toxic Pollutants • Compliance	40 CFR 129 4 40 CFR 129 5	~~AC~~	~~If the permitted point is used, then the NPDES permit discharge standards would have been met.~~

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TBC To Be Considered

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Requirement	Citation	Type	Comment
FEDERAL WATER POLLUTION CONTROL ACT {aka Clean Water Act (CWA)} [33 USC 1251 et. seq.]			
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM REGULATIONS • Designation of Hazardous Substances • Determination of Reportable Quantities for Hazardous Substances • Applicability of Best Management Practices • Best Management Practices Programs	 40 CFR 116 40 CFR 117 40 CFR 125 102 40 CFR 125 104	A	These subparts are applicable to storage and use of products that contain toxic and hazardous pollutants above reportable quantity limitations, at a facility covered by an NPDES permit ~~Only substantive portions of the regulations are required under CERCLA actions for onsite activities. No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely onsite, where such remedial action is selected and carried out in compliance with Section 121.~~
DISCHARGES OF DREDGED OR FILL MATERIAL INTO WATERS OF THE UNITED STATES • Discharges Requiring Permits	 33 USC 1344 33 CFR 323 3	A/L	Only substantive portions of the regulations are required under CERCLA actions for onsite activities
DOE COMPLIANCE WITH FLOODPLAIN/WETLANDS ENVIRONMENTAL REVIEW REQUIREMENTS • Floodplain/Wetlands Determination • Floodplain/Wetlands Assessment • Applicant Responsibilities	10 CFR 1022 11 12 13	A/L	

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TBC To Be Considered

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Requirement	Citation	Type	Comment
NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
ENDANGERED SPECIES ACT (ESA) [16 USC 1531 et seq.]			
BIOLOGICAL ASSESSMENT • Purpose • Preparation Requirements • Request for Information • Director's Response - No Listed Species or Critical Habitat Present - Listed Species or Critical Habitat Present • Verification of Current Accuracy of Species List • Contents • Identical/Similar to Previous Action • Permit Requirements • Completion Time • Submission of Biological Assessment • Use of Biological Assessment	50 CFR 402.12 ~~12(a)~~ ~~12(b)~~ ~~12(c)~~ ~~12(d)~~ ~~12(d)(1)~~ ~~12(d)(2)~~ ~~12(e)~~ ~~12(f)~~ ~~12(g)~~ ~~12(h)~~ ~~12(i)~~ ~~12(j)~~ ~~12(k)~~	A/L	Substantive compliance with the ESA is the responsibility of each Federal agency In cases where more than one Federal agency is involved in an action a lead Federal agency, as determined among the Federal agencies participating in the action, is designated The burden of consultation as required under ESA Section 7 and subsequent preparation of a biological assessment if appropriate is the responsibility of the lead Federal agency Federal agencies must use the consultation process to determine if their action poses an adverse impact to threatened and endangered species and their critical habitat It is within the spirit of the act that Federal agencies also consider candidate species, especially those species that may be headed toward listing, in their environmental planning
INTERAGENCY COOPERATION • Informal Consultation • Formal Consultation	50 CFR 402 13~~(a), (b)~~ 14~~(a)-(l)~~	A/L	~~If an endangered species is found, then interagency cooperation is required. Otherwise, interagency cooperation is a TBC and the policy of DOE is that interagency cooperation will be complete.~~ The U S Fish and Wildlife Service will be consulted as necessary to ensure that appropriate steps are taken pursuant to the ESA to protect Federal listed threatened and endangered species and their critical habitats

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TBC To Be Considered

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Requirement	Citation	Type	Comment
NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
LISTING ENDANGERED AND THREATENED SPECIES AND DESIGNATING CRITICAL HABITAT	50 CFR 424	A/L	
• Factors for Listing, Delisting, or Reclassifying Species	11		
• Criteria for Designating Critical Habitat	12		
ENDANGERED AND THREATENED WILDLIFE AND PLANTS	50 CFR 17	A/L	Current lists of threatened and endangered species of animals and plants pertinent to the ESA and of concern to DOE-RFFO at the Site should be obtained from the U S Fish and Wildlife Service, Colorado Field Office
• List of Endangered and Threatened Wildlife	11		
• List of Endangered and Threatened Plants	12		
• Interagency Cooperation Critical Habitats	94		
• Interagency Cooperation Critical Habitats - Fish and Wildlife	95		
• Interagency Cooperation Critical Habitats - Plants	96		
MIGRATORY BIRD TREATY [16 USC 701-715]			
TAKING, POSSESSION, TRANSPORTATION, SALE, PURCHASE, BARTER, EXPORTATION, AND IMPORTATION OF WILDLIFE AND PLANTS		A/L	
• The Purpose of the Regulation	50 CFR 10 1		
• List of Migratory Birds	50 CFR 10 13		
• Law Enforcement Offices	50 CFR 10 22		
• Civil Procedures	50 CFR 11		
EAGLE PROTECTION ACTS [16 USC 668 et. seq.]			

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TBC To Be Considered

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Requirement	Citation	Type	Comment
NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
BALD AND GOLDEN EAGLES			
• Prohibited Acts, Criminal Penalties	16 USC 668(a)		
• Civil Penalties	16 USC 668(b)		
• Cancellation of Grazing Agreements	16 USC 668(c)	A/L	
• Taking and Using of the Bald and Golden Eagle for Scientific, Exhibition, and Religious Purposes	16 USC 668a		
• Enforcement Provisions	16 USC 668b		

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TBC To Be Considered

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Requirement	Citation	Type	Comment
NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
COLORADO NONGAME, ENDANGERED, OR THREATENED SPECIES CONSERVATION ACT [CRS 33-1-115, 33-2-101 to 33-2-107]			
• Willful Destruction of Wildlife • Damage or Destruction of Dens or Nests - Harassment of Wildlife	CRS 33-6-117 CRS 33-6-128	A/L	
COLORADO NONGAME WILDLIFE • Protected Species • Endangered Wildlife - Designation of Species • Threatened Wildlife - Designation of Species • Nongame Wildlife - Designation of Species	2 CCR 406-8 Article I, #1000 Article II, #1002 Article III, #1003 Article IV, #1004	A/L	

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Requirement	Citation	Type	Comment
NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
FISH AND WILDLIFE COORDINATION ACT [16 USC 661 et seq.]			
• Purpose • Impounding, Diverting, or Controlling of Waters • Impoundment or Diversion of Waters • Rules and Regulations • Effects of Sewage and Industrial Waters • Authorization of Appropriations • Penalties • Definitions	16 USC 661 16 USC 662 16 USC 663 16 USC 664 16 USC 665 16 USC 666 16 USC 666a 16 USC 666b	A/L	

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Requirement	Citation	Type	Comment
NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
NATIONAL HISTORIC PRESERVATION ACT (NHPA) [16 USC 470 et. seq.]			
IDENTIFYING HISTORIC PROPERTIES • Assessing Information Needs • Locating Historic Properties • Evaluating Historical Significance • Whe No Historic Properties are Found • Historic Property Found	36 CFR 800.4 ~~4(a)~~ ~~4(b)~~ ~~4(c)~~ ~~4(d)~~ ~~4(e)~~	L	
ASSESSING EFFECTS OF THE ACTIVITY ON THE PROPERTY	36 CFR 800 5~~(a) (e)~~	L	
DOCUMENTATION REQUIREMENTS	36 CFR 800 8~~(a) (d)~~	L	
CRITERIA OF EFFECT AND ADVERSE EFFECT	36 CFR 800 9~~(a) (c)~~	L	
PROTECTING NATIONAL HISTORIC LANDMARKS	36 CFR 800 10	L	
HISTORIC PROPERTIES DISCOVERED DURING IMPLEMENTATION	36 CFR 800 11	L	
EMERGENCY UNDERTAKINGS	36 CFR 800 12	L	
PRESERVATION OF AMERICAN ANTIQUITIES	43 CFR 3	L	
PROTECTION OF ARCHEOLOGICAL RESOURCES	43 CFR 7	L	

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Requirement	Citation	Type	Comment
NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
COLORADO HISTORICAL, PREHISTORICAL, AND ARCHAEOLOGICAL RESOURCES [CRS 24-80-401 TO 410]			
ARCHAEOLOGICAL RESOURCES PROTECTION ACT [16 USC 470, Chapter 1B]			
PROTECTION OF ARCHAEOLOGICAL RESOURCES UNIFORM REGULATIONS	36 CFR 296		
• Purpose	1		
• Authority	2		
• Definitions	3		
• Prohibited Acts	4		
• Permit Requirements and Exceptions	5		
• Application for Permits and Information Collection	6		
• Notification to Indian Tribes of Possible Harm to, or Destruction of, Sites on Public Lands Having Religious or Cultural Importance	7	L	
• Relationship to Section 106 of the National Historic Preservation Act	12		
• Custody of Archeological Resources	13		
• Determination of Archeological or Commercial Value and Cost of Restoration and Repair	14		
• Assessment of Civil Penalties	15		
• Civil Penalty Amounts	16		
• Other Penalties and Rewards	17		
• Confidentiality of Archeological Resource Information	18		
• Report	19		

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TBC To Be Considered

TABLE 1 - DRAFT MASTER LIST OF POTENTIAL FEDERAL AND STATE ARARs FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
ARCHAEOLOGICAL AND HISTORICAL PRESERVATION ACT (AHPA) [16 USC 469a-1]			
• Notification and Request for Preservation of Data • Survey of Sites, Preservation of Data, Compensation	16 USC 469a-1(a) 16 USC 469a-1(b)	L	Differs from NHPA in that it encompasses a broader scope of resources than those listed on the National Register and requires only preservation of the data (including analysis and publication)

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TBC To Be Considered

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Requirement	Citation	Type	Comment
SAFE DRINKING WATER ACT (SDWA) [42 USC 300f et. seq.]			
COLORADO PRIMARY DRINKING WATER REGULATIONS • MCL for Microbiological Contaminants • MCL for Turbidity • MCLs for Inorganic Chemicals • MCLs for*p467XOfganicals - MCL for Volatile Organic Chemicals (VOCs) - MCL for Total Trihalomethanes (TTHMs) - MCLs for Synthetic Organic Chemicals (SOCs) • MCLs for Radioactivity - MCLs for Radium-226, Radium-228, and Gross Alpha Particle Activity in Community Water Systems - MCLs for Beta Particle and Photon Radioactivity From Man-Made Radionuclides in Community Water Systems	5 CCR 1003-1, [40 CFR 141] 3 1 2 4 1 1 5 2 1 5 2 2 5 2 4 5 2 3 6 1 1 6 1 2	C	These regulations may be relevant and appropriate to surface water ~~and ground water~~ under their current use classifications When permanent structures are put in place so that surface waters from RFETS no longer flow into, or have the potential to flow into, immediate downstream drinking water supplies, ~~the existing domestic use classification would not be considered relevant or appropriate~~ then DOE intends to file a petition with the Colorado Water Quality Control Commission to change the use classification. ~~When~~ If these structures are in place, the MCLs (MCLGs) ~~will~~ may not be relevant and appropriate
MAXIMUM CONTAMINANT LEVEL GOALS • MCLGs for Organic Contaminants • MCLGs for Inorganic Contaminants • MCLGs for Microbiological Contaminants	40 CFR 141 50 51 52	C	Non-zero MCLGs would also be relevant and appropriate to surface water ~~and ground water~~ possessing drinking water supply use classifications MCLGs equal to zero establish unattainable goals and are therefore not ARARs according to the NCP

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TBC To Be Considered

TABLE 1 - DRAFT MASTER LIST OF POTENTIAL FEDERAL AND STATE ARARs FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE C: HAZARDOUS WASTE MANAGEMENT [Colorado Hazardous Waste Act (CRS §§ 25-15-101 to -217)]			
The State of Colorado is authorized to administer portions of the hazardous waste management program (e g , RCRA) to regulate the generation, treatment, storage, and disposal of hazardous waste within Colorado As such, the Colorado regulations would be applicable to the management of hazardous waste These regulations may also be relevant and appropriate in situations where a remediation waste is "sufficiently similar" to a RCRA-listed waste (e g , waste which was generated and disposed of prior to the effective date of regulation) or when the proposed remedial action is similar to a RCRA-regulated activity and would be appropriate to ensure that the activity is protective of human health and the environment Although the Colorado hazardous waste management regulations are similar to the federal requirements, both the federal and state regulatory citations are provided for reference purposes and to denote that both federal and state requirements were considered in establishing the identifying the ARAR requirement adopted for the remediation of the RFETS Only substantive portions of the regulations are required under CERCLA actions for onsite activities The State has not verified that these are the only substantive standards. The final determination is predicated upon an analysis for a specific action. Under the IAG, all activities that are identified as treating, storing, or disposing of hazardous waste must meet the RCRA requirements that are set forth in the RFETS RCRA permit, which include both substantive and non-substantive portions of the RCRA regulations.			
SITING OF HAZARDOUS WASTE DISPOSAL SITES • Minimum Design Performance Criteria for Off-Site Hazardous Waste Disposal Sites and On-Site Hazardous Waste Landfills • Requirements for Siting and Design of Off-Site Hazardous Waste Disposal Sites and On-Site Hazardous Waste Landfills	6 CCR 1007-2 Part 2 4 Part 2 5	L	
IDENTIFICATION AND LISTING OF HAZARDOUS WASTES	6 CCR 1007-3, 261 [40 CFR 261]	A	
GENERATOR STANDARDS • Hazardous Waste Determinations • Record Keeping and Reporting Requirements - Record Keeping and Reporting	6 CCR 1007-3, 262 [40 CFR 262] 11 40 to 43	A	Persons who generate solid wastes are required to determine if the waste is hazardous The definition and procedures contained in 6 CCR 1007-3, 261 [40 CFR 261] are to be followed to make this determination

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TBC To Be Considered

TABLE 1 - DRAFT MASTER LIST OF POTENTIAL FEDERAL AND STATE ARARs FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE C: HAZARDOUS WASTE MANAGEMENT [Colorado Hazardous Waste Act (CRS §§ 25-15-101 to -217)]			
GENERAL FACILITY STANDARDS	6CCR 1007-3, 264 Subpart B [40CFR 264 Subpart B]		
• Waste Analysis	13~~(a)(1) to (3)~~	A/L	
• Security	14	A/L	Existing security measurements will be used and, where necessary, upgraded to prevent unknowing access to hazardous wastes
• General Inspection Requirements	15~~(a) to (c)~~	A/L	Inspections will be conducted as a standard of control to prevent release of hazardous waste constituents to the environment or a threat to human health Corrective actions will be taken resolve deficiencies
• Personnel Training	16	C/A	Personnel will be properly trained to prevent mismanagement of hazardous waste and/or regulatory violations
• General Requirements For Ignitable, Reactive, Or Incompatible Wastes	17~~(a) and (b)~~	C/A	Procedures will be implemented to prevent accidental ignition or reaction of ignitable or reactive waste, or the mixing of incompatible waste
• Construction Quality Assurance Program	19	A/L	A construction QA program will be implemented for the construction of any new hazardous waste disposal site

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GENERAL FACILITY STANDARDS (continued) Installation Standards • Seismic Considerations • Installation Standards - Floodplains - Hazardous Waste Disposal	6 CCR 1007-3, 264, Subpart B [40 CFR 264, Subpart B] 18~~(a)~~ ~~18(b)~~ ~~18(d)~~	A/L	Hazardous waste management facilities will not be located within a 100-year floodplain Hazardous waste is not to be disposed directly under or into surface water or groundwater that has a potential or existing beneficial use or that is in direct communication with an aquifer, unless said disposal is accomplished pursuant to a UIC permit
PREPAREDNESS AND PREVENTION • Design and Operation of Facility • Required Equipment • Testing and Maintenance of Equipment • Access to Communications or Alarm System • Required Aisle Space • Arrangements with local Authorities	6 CCR 1007-3, 264, Subpart C [40 CFR 264, Subpart C] 31 32 33 34 35 37	A/L	Hazardous waste facilities will be designed to minimize the potential for incidents Equipment will be provided to respond to credible incidents and arrangements with emergency response units will be executed

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CONTINGENCY PLAN AND EMERGENCY PROCEDURES • Purpose and Implementation • Content of Plan • Emergency Coordinator • Emergency procedures	6 CCR 1007-3, 264, Subpart D [40 CFR 264 Subpart D] 51~~(a)~~ 52~~(a)~~ 55 56~~(a) to (i)~~	A	The existing RFETS contingency plan will be reviewed and revised accordingly to ensure that the procedures are adequate to respond to any new conditions posed by the remedial actions and/or the operation of new hazardous waste management facilities
MANIFEST SYSTEM, RECORDKEEPING, AND REPORTING • Applicability • Operating Record • Availability, Retention, and Disposition of Records	6 CCR 1007-3 Part 264, Subpart E [40 CFR 264, Subpart E] 70 73 74	A	
GROUND WATER PROTECTION • Required Programs • Point of Compliance	6 CCR 1007-3, 264, Subpart F [40 CFR 264, Subpart F] 91~~(a)~~ 95	A/L	Groundwater monitoring will be conducted for hazardous waste for hazardous waste management units to ensure that contaminants which could adversely impact human health or the environment are not migrating into groundwaters as measured at the point of compliance ~~The point of compliance for hazardous waste disposal units at which waste will remain after closure of the RFETS is interpreted to be the RFETS site boundary.~~

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GROUND WATER PROTECTION (continued) • Ground-Water Protection Standard • Hazardous Constituents • Concentration Limits	6 CCR 1007-3, 264, Subpart F [40 CFR 264, Subpart F] 92 93 ~~94(a) and (b)~~	C	As part of the RFI/RI and CMS/FS process, remediation goals which are protective of human health and the environment will be established for the cleanup of groundwater The RCRA process for establishing groundwater protection standards will be incorporated when selecting the remedial goals Included in the selection process are background concentrations, drinking water standards (e g , MCLs), and alternative concentration limits (ACLs) ~~It is intended to establish ACLs that will maintain the designated use of the water quality (i e , MCLs and Colorado water quality standards 5 CCR 1002-8, Section 3 11 5) at the RFETS boundary.~~ The DOE may seek ACLs that will maintain the water quality that supports the designated use at the RFETS.

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GROUND WATER PROTECTION (continued) • Compliance Period • General Ground-Water Monitoring Requirements - Number of Wells - Casing - Sampling and Analysis Procedures - Statistical Methods Utilized	6 CCR 1007-3, 264, Subpart F [40 CFR 264, Subpart F] 96 97~~(a) and (b)~~ 97~~(c)~~ 97~~(d) to (g)~~ 97~~(h) and (i)~~	A	For any hazardous waste remaining onsite following the completion of closure activities, groundwater monitoring will be performed to demonstrate protectiveness of the selected remedial actions The ~~compliance period is defined as equal to the actual life of the waste management unit as determined by the State in the facility permit.~~ For monitoring that is being conducted as part of a RCRA corrective action, compliance period is extended until it can demonstrate that the ground-water protection standard has not been exceeded for a period of three consecutive years The five-year review provisions of CERCLA Section 121(c) {see 40 CFR 300 430(f)(4)(ii)} will be considered in establishing the compliance period Any additional monitoring wells that are installed as a result of remedial activities for the monitoring of hazardous waste management sites will conform to existing approved RCRA groundwater monitoring program

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GROUND WATER PROTECTION (continued) • Detection Monitoring Program - Parameters or Constituents - System and Procedures - Statistical Exceedences • Compliance Monitoring Program - Monitoring - Installation of System - Sampling Procedures and Statistical Methods - Evidence of Increased Contamination - Flow Rates • Corrective Action Program - Compliance with Groundwater Protection Standard - Prevent Hazardous Constituents from Exceeding Concentration Limits - Time Frame - Groundwater Monitoring - Corrective Action Measures • Corrective Action for Solid Waste Management Units	6 CCR 1007-3, 264, Subpart F [40 CFR 264, Subpart F] 98~~(a)~~ ~~98(b) to (f)~~ 98~~(g)~~ 99~~(a)~~ ~~99(b)~~ ~~99(c), (f), and (g)~~ ~~99(d)~~ ~~99(e)~~ 100~~(a)~~ ~~100(b)~~ ~~100(c)~~ ~~100(d)~~ ~~100(e) and (f)~~ 101~~(a) and (c)~~	A	~~Per the IAG, the RCRA corrective action provisions are being integrated with the CERCLA remedial action provisions. Therefore, the Parties intend that compliance with activities covered by the IAG will be deemed to achieve compliance with CERCLA, 42 USC § 9601 et seq.; to satisfy the corrective action requirements of Sections 3004(u) and (v) of RCRA/ 42 USC § 6924(u) and (v), for a RCRA permit, and Section 3008(h), 42 USC § 6928(h), for interim status facilities, the closure and corrective action requirements of CHWA; and to meet or exceed all applicable or relevant and appropriate Federal and State laws and regulations, to the extent required by Section 121 of CERCLA, 42 USC § 9621~~

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CLOSURE AND POST-CLOSURE	6 CCR 1007-3, 264, Subpart G [40 CFR 264, Subpart G]		~~The substantive requirements for closure and post-closure will be complied with.~~
• Closure Performance Standards	111	A	
• Disposal or Decontamination of Equipment, Structures and Soils	114		
• Maintenance, Monitoring, Security, and Care	117~~(a)(1) and (b)~~		
• Post-Closure Use of Property	~~117(c)~~		
USE AND MANAGEMENT OF CONTAINERS	6 CCR 1007-3, 264, Subpart I [40 CFR 264, Subpart I]		~~Hazardous waste containers will be managed in accordance with approved handling procedures and be stored at RCRA permitted storage areas and/or designated temporary units. Container storage areas will be closed in accordance with approved closure plans or IM/IRA documents.~~
• Condition of Containers	171		
• Compatibility of Waste with Containers	172		
• Management of Containers	173	A	
• Inspections	174		
• Containment			
- Containment System Design and Operation	175~~(b) to (d)~~		
- Containment for Ignitable or Reactive Wastes	176		
- Containment for Incompatible Wastes	177		
• Closure	178		

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TANK SYSTEMS	6 CCR 1007-3, 264, Subpart J [40 CFR 264, Subpart J]		Either existing or new tank systems will be used to treat or store hazardous waste generated as a result of remedial activities Existing tank systems will only be used if it is determined that the tank system is adequate and has sufficient integrity to prevent failure of the tank system during the proposed new use Existing tank systems will be closed in accordance with approved closure plans or IM/IRA documents
• Design and Installation of New tank Systems or Components	192	A	
• Containment and Detection of Releases			
- Secondary Containment	193~~(a) and (b)~~		
- Design and Construction	~~193(c)~~		
- Secondary Containment Devices	~~193(d)~~		
-- External Liner	~~193(e)(1)~~		
-- Vault System	~~193(e)(2)~~		
-- Double-Walled Tanks	~~193(e)(3)~~		
-- Ancillary Equipment	~~193(f)~~		
• General Operating Requirements	194		
• Inspections	195		
• Response to Leaks or Spills and Disposition of Leaking or Unfit-for-Use Tank Systems	196		
• Closure and Post-Closure Care	197		
• Special Requirements for Ignitable or Reactive Wastes	198		
• Special Requirements for Incompatible Wastes	199		
SURFACE IMPOUNDMENTS	6 CCR 1007-3, 264, Subpart K [40 CFR 264, Subpart K]	A	All existing hazardous waste surface impoundments (e g , Solar Evaporation Ponds) have been removed from service and are currently being closed The closure post-closure, and construction inspection requirements are included as part of the OU4 IM/IRA In the event surface impoundments units are identified as part of a potential remedy Subpart K will become an ARAR
• Monitoring and Inspection	226		
• Closure and Post-Closure Care	228		

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WASTE PILES	6 CCR 1007-3, 264, Subpart L [40 CFR 264, Subpart L]	~~A~~	There are no current or planned waste piles at the RFETS, therefore, the Subpart L provisions are not being listed as an ARAR
LAND TREATMENT	6 CCR 1007-3, 264, Subpart M [40 CFR 264 Subpart M]	~~A~~	In the event land treatment units are identified as part of a potential remedy, Subpart M will become an ARAR
LANDFILLS	6 CCR 1007-3, 264, Subpart N [40 CFR 264 Subpart N]	~~A~~	~~Not an ARAR because any onsite disposal will be under the CAMU rule~~
INCINERATORS	6 CCR 1007-3, 264, Subpart O [40 CFR 264, Subpart O]		These regulations are ARARs for the closure and/or the design, construction, and operation of a new incinerator system
• Waste Analysis	341	A	
• Principal Organic Hazardous Constituents	342		
• Performance Standards	343~~(a) to (c)~~		
• Operating Requirements	345		
• Monitoring and Inspections	347		
• Closure	351		

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CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS	6 CCR 1007-3, 264, Subpart S [40 CFR 264, Subpart S]		Colorado has adopted a CAMU/TU rule The provisions for designated CAMUs and TUs will be followed to facilitate implementation of a corrective action
• Corrective Action Management Units			
- Standards for Designating a CAMU	552~~(c) and (d)~~	A	
- Requirements for Groundwater Monitoring	~~552(e)(3)~~		
- Closure Requirements for CAMUs	~~552(e)(4)~~		
• Temporary Units			
- Requirements for TUs	553~~(b)~~		
- Factors for Establishing Standards for TUs	~~553(c)~~		
MISCELLANEOUS UNITS	6 CCR 1007-3, 264, Subpart X [40 CFR 264, Subpart X]		These standards are being listed as ARARs in the event that a miscellaneous unit is selected for the treatment of hazardous waste pursuant to the CMS/FS process
• Environmental Performance Standards			
- Groundwater and Subsurface Protection	601~~(a)~~	A	
- Surface Water, Wetland and Surface Soil Protection	~~601(b)~~		
- Air Protection	~~601(c)~~		
• Monitoring, Analysis, Inspection, Response, Reporting, and Corrective Action	602		
• Post-Closure Care	603		

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AIR EMISSION STANDARDS FOR PROCESS VENTS	6 CCR 1007-3, 264, Subpart AA [40 CFR 264 Subpart AA]		These standards will be incorporated into the design of process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations that manage hazardous wastes with organic concentrations of at least 10-ppm (by weight)
• Standards Process Vents	1032~~(a) to (c)~~	A	
• Standards Closed-Vent Systems and Control Devices	1033		
• Test Methods and Procedures	1034		
• Record Keeping Requirements	1035		
• Reporting Requirements	1036		

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AIR EMISSION STANDARDS FOR EQUIPMENT LEAKS	6 CCR 1007-3, 264, Subpart BB [40 CFR 264, Subpart BB]		These standards will be incorporated into the design of remediation equipment that contains or contacts hazardous wastes with organic concentrations of at least 10 percent by weight excluding equipment that is in vacuum service
• Standards Pumps in Light Liquid Service	1052		
• Standards Compressors	1053		
• Standards Pressure Relief Devices in Gas/Vapor Service	1054		
• Standards Sampling Connecting Systems	1055		
• Standards Open-Ended Valves or Lines	1056		
• Standards Valves in Gas/Vapor or Light Liquid Service	1057		
• Standards Pumps and Valves in Heavy Liquid Service, Pressure Relief Devices in Light or Heavy Liquid Service, Flanges, and Other Connectors	1058	A	
• Standards Closed-Vent Systems and Control Devices	1060		
• Alternative Standards for Valves in Gas/Vapor Service or in Light Liquid Service Percentage of Valves Allowed to Leak	1061		
• Alternative Standards for Valves in Gas/Vapor Service or in Light Liquid Service Skip Period Leak Detection and Repair	1062		
• Test Methods and Procedures	1063		
• Record Keeping Requirements	1064		
• Reporting Requirements	1065		

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CONTAINMENT BUILDINGS • Design and Operating Standards • Closure and Post-Closure Care	6 CCR 1007-3, 264, Subpart DD [40 CFR 264 Subpart DD] 1101 1102	A	These standards will be incorporated into the design of a containment building that is built to facilitate the management of hazardous remediation waste
AIR EMISSION STANDARDS FOR TANKS, SURFACE IMPOUNDMENTS, AND CONTAINERS (PROPOSED)	56 FR 33490, Proposed Rule for 40 CFR 264, Subpart CC	TBC	
IDENTIFICATION AND LISTING OF HAZARDOUS WASTE	40 CFR 267	A	Waste management plans will be developed to ensure compliance with the specific classes of hazardous waste (i e , Recyclable Materials Used In a Manner Constituting Disposal, Burning for Energy Recovery, Recyclable Materials Utilized for Precious Metal Recovery, and Spent Lead-Acid Batteries Being Reclaimed) identified in this regulation

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LAND DISPOSAL TREATMENT STANDARDS	6 CCR 1007-3, 268 [40 CFR 268]		
• General (Subpart A)		A	Waste management plans will be developed to ensure compliance with the Land Disposal Restrictions The performance requirements for hazardous waste treatment systems will be based on the LDR Treatment Standards contained in Subpart C
- Dilution Prohibition as a Substitute for Treatment	3		
- Waste Analysis	7		
- Special Rules Regarding Wastes that Exhibit a Characteristic	9		
• Prohibitions on Land Disposal (Subpart C)		A	
- Waste Specific Prohibitions - Solvent Wastes	30		
- Waste Specific Prohibitions - Dioxin-Containing Wastes	31		
- Waste Specific Prohibitions - California List Wastes	32		
- Waste Specific Prohibitions - First Third Wastes	33		
- Waste Specific Prohibitions - Second Third Wastes	34		
- Waste Specific Prohibitions - Third Third Wastes	35		
- Waste Specific Prohibitions - Newly Listed Wastes	36		

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LAND DISPOSAL TREATMENT STANDARDS (continued)	6 CCR 1007-3, 268 [40 CFR 268]		
• LDR Treatment Standards (Subpart D) - Treatment Standards Expressed as Concentrations in Waste Extract - Treatment Standards Expressed as Specified Technologies - Treatment Standards Expressed as Waste Concentrations - Variance from a Treatment Standard	42 USC § 6924(d)(2) 41 42 43 44	A	In addition to these regulations, EPA has recently promulgated Universal Treatment Standards and consolidated treatment standards for hazardous waste (see 59 FR 47982) This final rule is effective on December 19, 1994 in both authorized and non-authorized States The final rule replaces the current LDR treatment standard tables contained in Subpart D Authorized States are required to amended their regulations to obtain final authorization of the RCRA program This final rule is considered to be an ARAR for remedial actions In addition, EPA proposed a rule for the treatment of hazardous soils (see ⅜ FR 48092) This proposed rule is considered to be a TBC for the treatment of contaminated soils
• Prohibition on Storage of Restricted Waste (Subpart E)	50	A	

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SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE D: STATE OR REGIONAL SOLID WASTE PLANS COLORADO SOLID WASTE SITES AND FACILITIES [6 CCR 1007-2, Part 1]			
CLOSURE AND POST-CLOSURE			These regulations have been identified as potential ARARs with respect to closure of solid waste disposal sites
• Minimum Standards			
- Closure of Solid Waste Disposal Sites and Facilities	Section 2 5 1 to 2 5 9 [40 CFR 258 60 (a)-(h)]		
- Post-Closure Care and Maintenance Standards	Section 2 6 1 to 2 6 2 [40 CFR 258 61 (a)-(e)]	A	
• Standards for Solid Waste Disposal Landfill Sites and Facilities			
- Closure	Section 3 5 1 to 3 5 8 [40 CFR 258 60 (a)-(h)]		
- Post-Closure Care and Maintenance	Section 3 6 1 to 3 6 3 [40 CFR 258 61 (a)-(e)]		

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Requirement	Citation	Type	Comment
SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE I: REGULATION OF UNDERGROUND STORAGE TANKS [CRS §§ 8-20-501 to -608; CRS §§ 25-18-101 to -109]			
UNDERGROUND STORAGE TANK REQUIREMENTS	7 CCR 1101-14 6 CCR 1007-5 [40 CFR 280]	A	

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Requirement	Citation	Type	Comment
TOXIC SUBSTANCES CONTROL ACT (TSCA) [15 USC 2601 et seq.]			
LABELING OF PCBs AND PCB ITEMS	40 CFR 761 40 and 45	A	
DISPOSAL REQUIREMENTS • Liquid, Non-liquid PCB Waste • PCB Articles • PCB Containers • Spills • Testing Procedures	40 CFR 761 60 ~~60(a)~~ ~~60(b)~~ ~~60(c)~~ ~~60(d)~~ ~~60(g)~~	A	Waste management plans will be developed to ensure compliance with the specific requirements for PCB waste identified in this regulation
STORAGE REQUIREMENTS FOR PCBs • Time Limits • Facility Criteria • Temporary Storage • Inspections • Container Specifications • Marking • Laboratory Sample Exemption From Manifesting	40 CFR 761.65 ~~65(a)~~ ~~65(b) and (c)(3)~~ ~~65(e)(1) and (4)~~ ~~65(e)(5)~~ ~~65(e)(6) and (7)(i)~~ ~~65(e)(8)~~ ~~65(i)(2)(3)~~	A	
INCINERATION • Liquid PCBs - Operating Requirements • Nonliquid PCBs	40 CFR 761 70 ~~70(a)(1) to (9)~~ ~~70(b)(1) and (2)~~	A	These regulations would only be ARARs for the construction and operation of an onsite PCB incinerator, it is envisioned that this will not occur

A - Action-Specific ARAR
C - Chemical-Specific ARAR
L - Location- Specific ARAR
TBC To Be Considered

TABLE 1 - DRAFT MASTER LIST OF POTENTIAL FEDERAL AND STATE ARARs FOR THE ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Requirement	Citation	Type	Comment
TOXIC SUBSTANCES CONTROL ACT (TSCA) [15 USC 2601 et seq.]			
CHEMICAL WASTE LANDFILLS • Technical Requirements - Soils - Synthetic Membrane Liners - Hydrologic Conditions - Flood Protection - Topography - Monitoring Systems - Leachate Collection	40 CFR 761.~~75~~ ~~75(b)(1)~~ ~~75(b)(2)~~ ~~75(b)(3)~~ ~~75(b)(4)~~ ~~75(b)(5)~~ ~~75(b)(6)~~ ~~75(b)(7)~~	A	These regulations would only be ARARs for the construction and operation of an onsite PCB disposal cell, it is envisioned that this will not occur
DECONTAMINATION • Containers • Movable Equipment	~~40 CFR 761.79~~ ~~40 CFR 761 79(a)~~ ~~40 CFR 761 79(b)~~	A	
PCB SPILL CLEANUP • Requirements for PCB Spill Cleanup - Disposal of Cleanup Debris and Materials - Determination of Spill Boundaries - Spills of <500 ppm PCBs, Involve <1 lb of PCBs by wt - Spills of ≥500 ppm PCBs, Involve ≥1 lb of PCBs by wt - Time Limits and Actions Within the First 24 Hours - Requirements for Decontaminating Spills in Outdoor Electrical Substations - Requirements for Decontaminating Spills in Restricted Access Areas - Sampling Requirements	40 CFR 761 125~~(a)(2)~~ ~~125(a)(3)~~ ~~125(b)(1)~~ ~~125(c)(2) to (4)~~ ~~125(e)(1)~~ ~~125(e)(2)~~ ~~125(e)(3)(i) to (v)~~ 130~~(a) to (e)~~	TBC	40 CFR 761 Subpart G is entitled *PCB Spill Cleanup Policy* and thus many of the sections in Subpart G, specifically for spills after May 4, 1987, are "to be considered" (TBC), 40 CFR 761 125 contains PCB cleanup requirements that may be considered enforceable substantive environmental standards and thus potential ARARs

A - Action-Specific ARAR
C - Chemical-Specific ARAR
L - Location- Specific ARAR
TBC To Be Considered

Appendix B

Programmatic Risk-Based Preliminary Remediation Goals

PPRGs were developed by DOE, EPA, and CDPHE based on a 10^{-6} risk The PPRG ratio of at least 100 is a risk level of approximately 10^{-4} assuming single analyte contamination (100 X PPRG of contaminant = 10^{-4}) The PPRG ratio is calculated by (analyte concentration / PPRG of analyte = PPRG ratio) The following pages list the specific PPRG level for each analyte

PROGRAMMATIC RISK-BASED PRELIMINARY REMEDIATION GOALS

U.S. DEPARTMENT OF ENERGY
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
GOLDEN, COLORADO

FINAL
REVISION 3

AUGUST 1995

PROGRAMMATIC PRELIMINARY RISK-BASED REMEDIATION GOALS FOR RFETS

Target Analyte List Chemical	Residential Groundwater (mg/L)	Residential Surface Water Swimming (mg/L)	Residential Soil (mg/kg)	Office Worker Soil (mg/kg)	Construction Worker Subsurface Soil (mg/kg)	Wading Ecological Worker (mg/L)	Soil Ecological Worker (mg/kg)	Open Space Surface Water (mg/L)	Open Space Soil/Sediment (mg/kg)
Acenaphthene#	2 19E+00	1 68E+03	1 65E+04	1 23E+05	1 06E+05	2 55E+03	2 22E+05	2 04E+03	4 61E+05
Acenaphthylene#	-	-	-	-	-	-	-	-	-
Acetone#	3 65E+00	2 81E+03	2 74E+04	2 04E+05	1 77E+05	4 26E+03	3 71E+05	3 41E+03	7 68E+05
Aldrin	5 00E-06	3 85E-03	3 77E-02	3 36E-01	7 30E+00	7 01E-02	6 10E+00	4 68E-03	1 03E+00
Aluminum	1 06E+02	8 14E+04	7 96E+05	5 93E+06	5 15E+06	1 23E+05	1 08E+07	9 88E+04	2 23E+07
Anthracene#	1 10E+01	8 42E+03	8 23E+04	6 13E+05	5 32E+05	1 28E+04	1 11E+06	1 02E+04	2 30E+06
Antimony	1 46E-02	1 12E+01	1 10E+02	8 18E+02	7 10E+02	1 70E+01	1 48E+03	1 36E+01	3 07E+03
Aroclor-1016	2 56E-03	1 97E+00	1 92E+01	1 43E+02	1 24E+02	2 98E+00	2 60E+02	2 38E+00	5 38E+02
Aroclor-1221	1 10E-05	8 51E-03	8 32E-02	7 43E-01	1 61E+01	1 55E-01	1 35E+01	1 03E-02	2 32E+00
Aroclor-1232	1 10E-05	8 51E-03	8 32E-02	7 43E-01	1 61E+01	1 55E-01	1 35E+01	1 03E-02	2 32E+00
Aroclor-1242	1 10E-05	8 51E-03	8 32E-02	7 43E-01	1 61E+01	1 55E-01	1 35E+01	1 03E-02	2 32E+00
Aroclor-1248	1 10E-05	8 51E-03	8 32E-02	7 43E-01	1 61E+01	1 55E-01	1 35E+01	1 03E-02	2 32E+00
Aroclor-1254	1 10E-05	8 51E-03	8 32E-02	7 43E-01	1 61E+01	1 55E-01	1 35E+01	1 03E-02	2 32E+00
Aroclor-1260	1 10E-05	8 51E-03	8 32E-02	7 43E-01	1 61E+01	1 55E-01	1 35E+01	1 03E-02	2 32E+00
Arsenic	4 86E-05	3 74E-02	3 66E-01	3 27E+00	7 09E+01	6 81E-01	5 93E+01	4 54E-02	1 00E+01
Barium	2 56E+00	1 97E+03	1 91E+04	1 41E+05	1 24E+05	2 98E+03	2 60E+05	2 38E+03	5 35E+05
Benzene#	6 17E-04	2 26E+00	2 21E+01	1 97E+02	1 33E+03	4 11E+01	3 58E+03	2 74E+00	6 17E+02
alpha-BHC	1 35E-05	1 04E-02	1 02E-01	9 08E-01	1 97E+01	1 89E-01	1 65E+01	1 26E-02	2 78E+00
beta-BHC	4 72E-05	3 64E-02	3 56E-01	3 18E+00	6 90E+01	6 62E-01	5 77E+01	4 42E-02	9 75E+00
delta-BHC	-	-	-	-	-	-	-	-	-
gamma-BHC (Lindane)	6 54E-05	5 04E-02	4 93E-01	4 40E+00	9 55E+01	9 17E-01	7 98E+01	6 11E-02	1 38E+01
Benzo(a)anthracene	1 16E-04	8 97E-02	8 77E-01	7 84E+00	1 70E+02	1 63E+00	1 42E+02	1 09E-01	2 45E+01
Benzo(a)pyrene	1 16E-05	8 97E-03	8 77E-02	7 84E-01	1 70E+01	1 63E-01	1 42E+01	1 09E-02	2 45E+00
Benzo(b)fluoranthene	1 16E-04	8 97E-02	8 77E-01	7 84E+00	1 70E+02	1 63E+00	1 42E+02	1 09E-01	2 45E+01
Benzo(g,h,i)perylene	-	-	-	-	-	-	-	-	-
Benzo(k)fluoranthene	1 16E-03	8 97E-01	8 77E+00	7 84E+01	1 70E+03	1 63E+01	1 42E+03	1 09E+00	2 45E+02
Benzoic Acid	1 46E+02	1 12E+05	1 10E+06	8 18E+06	7 10E+06	1 70E+05	1 48E+07	1 36E+05	3 07E+07
Benzyl Alcohol	1 10E+01	8 42E+03	8 23E+04	6 13E+05	5 32E+05	1 28E+04	1 11E+06	1 02E+04	2 30E+06
Beryllium	1 98E-05	1 52E-02	1 49E-01	1 33E+00	2 89E+01	2 77E-01	2 41E+01	1 85E-02	4 08E+00
bis(2-Chloroethoxy)methane#	-	-	-	-	-	-	-	-	-
bis(2-Chloroethyl)ether#	1 63E-05	5 95E-02	5 82E-01	5 20E+00	1 13E+02	1 08E+00	9 43E+01	7 23E-02	1 63E+01
bis(2-Chloroisopropyl)ether#	4 22E-04	9 36E-01	9 15E+00	8 17E+01	1 77E+03	1 70E+01	1 48E+03	1 14E+00	2 56E+02

PROGRAMMATIC PRELIMINARY RISK-BASED REMEDIATION GOALS FOR RFETS

Target Analyte List Chemical	Residential Groundwater (mg/L)	Residential Surface Water Swimming (mg/L)	Residential Soil (mg/kg)	Office Worker Soil (mg/kg)	Construction Worker Subsurface Soil (mg/kg)	Wading Ecological Worker (mg/L)	Soil Ecological Worker (mg/kg)	Open Space Surface Water (mg/L)	Open Space Soil/Sediment (mg/kg)
bis(2-Ethylhexyl)phthalate	6 07E-03	4 68E+00	4 57E+01	4 09E+02	8 87E+03	8 51E+01	7 41E+03	5 68E+00	1 28E+03
Bromodichloromethane#	1 37E-03	1 06E+00	1 03E+01	9 23E+01	2 00E+03	1 92E+01	1 67E+03	1 28E+00	2 89E+02
Bromoform#	3 77E-03	8 29E+00	8 11E+01	7 24E+02	1 14E+04	1 51E+02	1 31E+04	1 01E+01	2 27E+03
Bromomethane#	1 09E-02	3 93E+01	3 84E+02	2 86E+03	2 48E+03	5 96E+01	5 19E+03	4 77E+01	1 08E+04
4-Bromophenyl phenyl ether	-	-	-	-	-	-	-	-	-
2-Butanone#	2 47E+00	1 68E+04	1 65E+05	1 23E+06	1 06E+06	2 55E+04	2 22E+06	2 04E+04	4 61E+06
Butylbenzylphthalate	7 30E+00	5 62E+03	5 49E+04	4 09E+05	3 55E+05	8 52E+03	7 42E+05	6 81E+03	1 54E+06
Cadmium	1 83E-02	1 40E+01	1 37E+02	1 02E+03	8 87E+02	2 13E+01	1 85E+03	1 70E+01	3 84E+03
Calcium	-	-	-	-	-	-	-	-	-
Carbon disulfide#	2 76E-02	2 81E+03	2 74E+04	2 04E+05	1 77E+05	4 26E+03	3 71E+05	3 41E+03	7 68E+05
Carbon tetrachloride#	2 60E-04	5 04E-01	4 93E+00	4 40E+01	3 70E+02	9 17E+00	7 98E+02	6 11E-01	1 38E+02
Cesium	-	-	-	-	-	-	-	-	-
alpha-Chlordane	6 54E-05	5 04E-02	4 93E-01	4 40E+00	9 55E+01	9 17E-01	7 98E+01	6 11E-02	1 35E+01
beta-Chlordane	6 54E-05	5 04E-02	4 93E-01	4 40E+00	9 55E+01	9 17E-01	7 98E+01	6 11E-02	1 35E+01
gamma-Chlordane	6 54E-05	5 04E-02	4 93E-01	4 40E+00	9 55E+01	9 17E-01	7 98E+01	6 11E-02	1 35E+01
4-Chloroaniline	1 46E-01	1 12E+02	1 10E+03	8 18E+03	7 10E+03	1 70E+02	1 48E+04	1 36E+02	3 07E+04
Chlorobenzene#	5 16E-02	5 62E+02	5 49E+03	4 09E+04	9 17E+03	8 52E+02	7 42E+04	6 81E+02	1 54E+05
Chloroethane#	2 78E+01	-	-	-	1 04E+06	-	-	-	-
Chloroform#	2 76E-04	1 07E+01	1 05E+02	9 38E+02	5 68E+02	1 95E+02	1 70E+04	1 30E+01	2 93E+03
Chloromethane#	2 32E-03	5 04E+00	4 93E+01	4 40E+02	9 55E+03	9 17E+01	7 98E+03	6 11E+00	1 38E+03
4-Chloro-3-methylphenol	-	-	-	-	-	-	-	-	-
2-Chloronaphthalene#	2 92E+00	2 25E+03	2 20E+04	1 64E+05	1 42E+05	3 41E+03	2 97E+05	2 73E+03	6 14E+05
2-Chlorophenol#	1 83E-01	1 40E+02	1 37E+03	1 02E+04	8 87E+03	2 13E+02	1 85E+04	1 70E+02	3 84E+04
4-Chlorophenyl phenyl ether	-	-	-	-	-	-	-	-	-
Chromium III	3 65E+01	2 81E+04	2 74E+05	2 04E+06	1 77E+06	4 26E+04	3 71E+06	3 41E+04	7 68E+06
Chromium VI	1 83E-01	1 40E+02	9 39E+02	4 86E+03	8 87E+03	2 13E+02	1 85E+04	1 70E+02	3 67E+04
Chyrsene	1 16E-02	8 97E+00	8 77E+01	7 84E+02	1 70E+04	1 63E+02	1 42E+04	1 09E+01	2 45E+03
Cobalt	2 19E+00	1 68E+03	1 65E+04	1 23E+05	1 06E+05	2 55E+03	2 22E+05	2 04E+03	4 61E+05
Copper	1 46E+00	1 12E+03	1 10E+04	8 18E+04	7 10E+04	1 70E+03	1 48E+05	1 36E+03	3 07E+05
Cyanide	7 30E-01	5 62E+02	5 49E+03	4 09E+04	3 55E+04	8 52E+02	7 42E+04	6 81E+02	1 54E+05
4,4-DDD	3 54E-04	2 73E-01	2 67E+00	2 38E+01	5 17E+02	4 97E+00	4 32E+02	3 31E-01	7 46E+01
4,4-DDE	2 50E-04	1 93E-01	1 88E+00	1 68E+01	3 65E+02	3 51E+00	3 05E+02	2 34E-01	5 26E+01
4,4-DDT	2 50E-04	1 93E-01	1 88E+00	1 68E+01	3 65E+02	3 51E+00	3 05E+02	2 34E-01	5 16E+01

PROGRAMMATIC PRELIMINARY RISK-BASED REMEDIATION GOALS FOR RFETS

Target Analyte List Chemical	Residential Groundwater (mg/L)	Residential Surface Water Swimming (mg/L)	Residential Soil (mg/kg)	Office Worker Soil (mg/kg)	Construction Worker Subsurface Soil (mg/kg)	Wading Ecological Worker (mg/L)	Soil Ecological Worker (mg/kg)	Open Space Surface Water (mg/L)	Open Space Soil/Sediment (mg/kg)
Dibenz(a,h)anthracene	1 16E-05	8 97E-03	8 77E-02	7 84E-01	1 70E+01	1 63E-01	1 42E+01	1 09E-02	2 45E+00
Dibenzofuran	-	-	-	-	-	-	-	-	-
Dibromochloromethane	1 01E-03	7 80E-01	7 62E+00	6 81E+01	1 48E+03	1 42E+01	1 24E+03	9 46E-01	2 13E+02
Di-n-butylphthalate	3 65E+00	2 81E+03	2 74E+04	2 04E+05	1 77E+05	4 26E+03	3 71E+05	3 41E+03	7 68E+05
1,2-Dichlorobenzene#	4 67E-01	2 53E+03	2 47E+04	1 84E+05	1 60E+05	3 83E+03	3 34E+05	3 07E+03	6 91E+05
1,3-Dichlorobenzene#	-	-	-	-	-	-	-	-	-
1,4-Dichlorobenzene#	3 54E-03	2 73E+00	2 67E+01	2 38E+02	5 17E+03	4 97E+01	4 32E+03	3 31E+00	7 46E+02
3,3-Dichlorobenzidine	1 89E-04	1 46E-01	1 42E+00	1 27E+01	2 76E+02	2 65E+00	2 31E+02	1 77E-01	3 98E+01
1,1-Dichloroethane#	1 01E+00	2 81E+03	2 74E+04	2 04E+05	5 30E+04	4 26E+03	3 71E+05	3 41E+03	7 68E+05
1,2-Dichloroethane#	1 97E-04	7 20E-01	7 04E+00	6 29E+01	4 12E+02	1 31E+01	1 14E+03	8 74E-01	1 97E+02
1,1-Dichloroethene#	1 67E-05	1 09E-01	1 07E+00	9 53E+00	1 52E+01	1 99E+00	1 73E+02	1 32E-01	2 98E+01
1,2-Dichloroethene (total)#	3 29E-01	2 53E+02	2 47E+03	1 84E+04	1 60E+04	3 83E+02	3 34E+04	3 07E+02	6 91E+04
2,4-Dichlorophenol	1 10E-01	8 42E+01	8 23E+02	6 13E+03	5 32E+03	1 28E+02	1 11E+04	1 02E+02	2 30E+04
1,2-Dichloropropane#	1 25E-03	9 63E-01	9 42E+00	8 41E+01	1 83E+03	1 75E+01	1 53E+03	1 17E+00	2 63E+02
cis-1,3-Dichloropropene#	1 27E-04	3 64E-01	3 56E+00	3 18E+01	5 32E+02	6 62E+00	5 77E+02	4 42E-01	9 94E+01
trans-1,3-Dichloropropene#	1 27E-04	3 64E-01	3 56E+00	3 18E+01	5 32E+02	6 62E+00	5 77E+02	4 42E-01	9 94E+01
Dieldrin	5 31E-06	4 09E-03	4 00E-02	3 57E-01	7 76E+00	7 45E-02	6 49E+00	4 97E-03	1 10E+00
Diethylphthalate	2 92E+01	2 25E+04	2 20E+05	1 64E+06	1 42E+06	3 41E+04	2 97E+06	2 73E+04	6 14E+06
2,4-Dimethylphenol#	7 30E-01	5 62E+02	5 49E+03	4 09E+04	3 55E+04	8 52E+02	7 42E+04	6 81E+02	1 54E+05
Dimethylphthalate	3 65E+02	2 81E+05	2 74E+06	2 04E+07	1 77E+07	4 26E+05	3 71E+07	3 41E+05	7 68E+07
4,6-Dinitro-2-methylphenol#	-	-	-	-	-	-	-	-	-
2,4-Dinitrophenol	7 30E-02	5 62E+01	5 49E+02	4 09E+03	3 55E+03	8 52E+01	7 42E+03	6 81E+01	1 54E+04
2,4-Dinitrotoluene	7 30E-02	5 62E+01	5 49E+02	4 09E+03	3 55E+03	8 52E+01	7 42E+03	6 81E+01	1 54E+04
2,6-Dinitrotoluene	1 25E-04	9 63E-02	9 42E-01	8 41E+00	1 83E+02	1 75E+00	1 53E+02	1 17E-01	2 63E+01
Di-n-octylphthalate	7 30E-01	5 62E+02	5 49E+03	4 09E+04	3 55E+04	8 52E+02	7 42E+04	5 68E+00	1 28E+03
Endosulfan I	2 19E-01	1 68E+02	1 65E+03	1 23E+04	1 06E+04	2 55E+02	2 22E+04	2 04E+02	4 61E+04
Endosulfan II	2 19E-01	1 68E+02	1 65E+03	1 23E+04	1 06E+04	2 55E+02	2 22E+04	2 04E+02	4 61E+04
Endosulfan sulfate	2 19E-01	1 68E+02	1 65E+03	1 23E+04	1 06E+04	2 55E+02	2 22E+04	2 04E+02	4 61E+04
Endosulfan (technical)	2 19E-01	1 68E+02	1 65E+03	1 23E+04	1 06E+04	2 55E+02	2 22E+04	2 04E+02	4 61E+04
Endrin ketone	-	-	-	-	-	-	-	-	-
Endrin (technical)	1 10E-02	8 42E+00	8 23E+01	6 13E+02	5 32E+02	1 28E+01	1 11E+03	1 02E+01	2 30E+03
Ethylbenzene#	1 58E+00	2 81E+03	2 74E+04	2 04E+05	1 48E+05	4 26E+03	3 71E+05	3 41E+03	7 68E+05
Fluoranthene	1 46E+00	1 12E+03	1 10E+04	8 18E+04	7 10E+04	1 70E+03	1 48E+05	1 36E+03	3 07E+05

PROGRAMMATIC PRELIMINARY RISK-BASED REMEDIATION GOALS FOR RFETS

Target Analyte List Chemical	Residential Groundwater (mg/L)	Residential Surface Water Swimming (mg/L)	Residential Soil (mg/kg)	Office Worker Soil (mg/kg)	Construction Worker Subsurface Soil (mg/kg)	Wading Ecological Worker (mg/L)	Soil Ecological Worker (mg/kg)	Open Space Surface Water (mg/L)	Open Space Soil/Sediment (mg/kg)
Fluorene#	1 46E+00	1 12E+03	1 10E+04	8 18E+04	7 10E+04	1 70E+03	1 48E+05	1 36E+03	3 07E+05
Heptachlor	1 89E-05	1 46E-02	1 42E-01	1 27E+00	2 76E+01	2 65E-01	2 31E+01	1 77E-02	3 90E+00
Heptachlor epoxide	9 34E-06	7 20E-03	7 04E-02	6 29E-01	1 36E+01	1 31E-01	1 14E+01	8 74E-03	1 93E+00
Hexachlorobenzene	5 31E-05	4 09E-02	4 00E-01	3 57E+00	7 76E+01	7 45E-01	6 49E+01	4 97E-02	1 10E+01
Hexachlorobutadiene	1 09E-03	8 40E-01	8 21E+00	7 33E+01	3 55E+02	8 52E+00	7 42E+02	1 02E+00	2 25E+02
Hexachlorocyclopentadiene	2 56E-01	1 97E+02	1 91E+03	1 42E+04	1 24E+04	2 98E+02	2 60E+04	2 38E+02	5 36E+04
Hexachloroethane	6 07E-03	4 68E+00	4 57E+01	4 09E+02	1 77E+03	4 26E+01	3 71E+03	5 68E+00	1 25E+03
2-Hexanone#	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	1 16E-04	8 97E-02	8 77E-01	7 84E+00	1 70E+02	1 63E+00	1 42E+02	1 09E-01	2 45E+01
Iron	-	-	-	-	-	-	-	-	-
Isophorone	8 95E-02	6 89E+01	6 74E+02	6 02E+03	1 31E+05	1 25E+03	1 09E+05	8 37E+01	1 88E+04
Lead	-	-	-	-	-	-	-	-	-
Lithium	7 30E-01	5 62E+02	5 49E+03	4 09E+04	3 55E+04	8 52E+02	7 42E+04	6 81E+02	1 54E+05
Magnesium	-	-	-	-	-	-	-	-	-
Manganese	1 83E-01	1 40E+02	1 36E+03	1 01E+04	8 86E+03	2 13E+02	1 85E+04	1 70E+02	3 83E+04
Mercury	1 10E-02	8 42E+00	8 23E+01	6 13E+02	5 32E+02	1 28E+01	1 11E+03	1 02E+01	2 31E+03
Methoxychlor	1 83E-01	1 40E+02	1 37E+03	1 02E+04	8 87E+03	2 13E+02	1 85E+04	1 70E+02	3 84E+04
Methylene chloride#	6 22E-03	8 73E+00	8 54E+01	7 63E+02	1 66E+04	1 59E+02	1 38E+04	1 06E+01	2 39E+03
2-Methylnaphthalene#	-	-	-	-	-	-	-	-	-
4-Methyl-2-pentanone#	2 03E-01	2 25E+03	2 20E+04	1 64E+05	1 42E+05	3 41E+03	2 97E+05	2 73E+03	6 14E+05
2-Methylphenol	1 83E+00	1 40E+03	1 37E+04	1 02E+05	8 87E+04	2 13E+03	1 85E+05	1 70E+03	3 84E+05
4-Methylphenol	-	-	-	-	-	-	-	-	-
Molybdenum	1 83E-01	1 40E+02	1 37E+03	1 02E+04	8 87E+03	2 13E+02	1 85E+04	1 70E+02	3 84E+04
Naphthalene#	1 46E+00	1 12E+03	1 10E+04	8 18E+04	7 10E+04	1 70E+03	1 48E+05	1 36E+03	3 07E+05
Nickel	7 30E-01	5 62E+02	5 49E+03	4 09E+04	3 55E+04	8 52E+02	7 42E+04	6 81E+02	1 54E+05
2-Nitroaniline	-	-	-	-	-	-	-	-	-
3-Nitroaniline	-	-	-	-	-	-	-	-	-
4-Nitroaniline	-	-	-	-	-	-	-	-	-
Nitrobenzene#	4 20E-03	1 40E+01	1 37E+02	1 02E+03	8 87E+02	2 13E+01	1 85E+03	1 70E+01	3 84E+03
2-Nitrophenol	-	-	-	-	-	-	-	-	-
4-Nitrophenol#	-	-	-	-	-	-	-	-	-
n-Nitrosodiphenylamine#	1 73E-02	1 34E+01	1 31E+02	1 17E+03	2 53E+04	2 43E+02	2 12E+04	1 62E+01	3 65E+03
n-Nitrosodipropylamine	1 21E-05	9 36E-03	9 15E-02	8 17E-01	1 77E+01	1 70E-01	1 48E+01	1 14E-02	2 56E+00

PROGRAMMATIC PRELIMINARY RISK-BASED REMEDIATION GOALS FOR RFETS

Target Analyte List Chemical	Residential Groundwater (mg/L)	Residential Surface Water Swimming (mg/L)	Residential Soil (mg/kg)	Office Worker Soil (mg/kg)	Construction Worker Subsurface Soil (mg/kg)	Wading Ecological Worker (mg/L)	Soil Ecological Worker (mg/kg)	Open Space Surface Water (mg/L)	Open Space Soil/Sediment (mg/kg)
Pentachlorophenol	7 08E-04	5 46E-01	5 34E+00	4 77E+01	1 03E+03	9 93E+00	8 65E+02	6 62E-01	1 49E+02
Phenanthrene#	-	-	-	-	-	-	-	-	-
Phenol	2 19E+01	1 68E+04	1 65E+05	1 23E+06	1 06E+06	2 55E+04	2 22E+06	2 04E+04	4 61E+06
Potassium	-	-	-	-	-	-	-	-	-
Pyrene	1 10E+00	8 42E+02	8 23E+03	6 13E+04	5 32E+04	1 28E+03	1 11E+05	1 02E+03	2 30E+05
Selenium	1 83E-01	1 40E+02	1 37E+03	1 02E+04	8 87E+03	2 13E+02	1 85E+04	1 70E+02	3 84E+04
Silver	1 83E-01	1 40E+02	1 37E+03	1 02E+04	8 87E+03	2 13E+02	1 85E+04	1 70E+02	3 84E+04
Sodium	-	-	-	-	-	-	-	-	-
Strontium	2 19E+01	1 68E+04	1 65E+05	1 23E+06	1 06E+06	2 55E+04	2 22E+06	2 04E+04	4 61E+06
Stryene#	2 01E+00	5 62E+03	5 49E+04	4 09E+05	2 04E+05	8 52E+03	7 42E+05	6 81E+03	1 54E+06
1,1,2,2-Tetrachloroethane#	8 95E-05	3 28E-01	3 20E+00	2 86E+01	6 21E+02	5 96E+00	5 19E+02	3 97E-01	8 95E+01
Tetrachloroethene#	1 43E-03	1 26E+00	1 23E+01	1 10E+02	2 21E+03	2 29E+01	2 00E+03	1 53E+00	3 44E+02
Thallium	-	-	-	-	-	-	-	-	-
Tin	2 19E+01	1 68E+04	1 65E+05	1 23E+06	1 06E+06	2 55E+04	2 22E+06	2 04E+04	4 61E+06
Toluene#	9 65E-01	5 62E+03	5 49E+04	4 09E+05	1 16E+05	8 52E+03	7 42E+05	6 81E+03	1 54E+06
Toxaphene	7 73E-05	5 95E-02	5 82E-01	5 20E+00	1 13E+02	1 08E+00	9 43E+01	7 23E-02	1 59E+01
1,2,4-Trichlorobenzene#	2 19E-01	2 81E+02	2 74E+03	2 04E+04	1 77E+04	4 26E+02	3 71E+04	3 41E+02	7 68E+04
1,1,1-Trichloroethane#	-	-	-	-	-	-	-	-	-
1,1,2-Trichloroethane#	3 18E-04	1 15E+00	1 12E+01	1 00E+02	2 18E+03	2 09E+01	1 82E+03	1 39E+00	3 14E+02
Trichloroethene#	2 55E-03	5 95E+00	5 82E+01	5 20E+02	5 12E+03	1 08E+02	9 43E+03	7 23E+00	1 63E+03
2,4,5-Trichlorophenol	3 65E+00	2 81E+03	2 74E+04	2 04E+05	1 77E+05	4 26E+03	3 71E+05	3 41E+03	7 68E+05
2,4,6-Trichlorophenol	7 73E-03	5 95E+00	5 82E+01	5 20E+02	1 13E+04	1 08E+02	9 43E+03	7 23E+00	1 59E+03
Vanadium	2 56E-01	1 97E+02	1 92E+03	1 43E+04	1 24E+04	2 98E+02	2 60E+04	2 38E+02	5 38E+04
Vinyl acetate	3 65E+01	2 81E+04	2 74E+05	2 04E+06	1 77E+06	4 26E+04	3 71E+06	-	7 68E+06
Vinyl chloride#	2 81E-05	3 45E-02	3 37E-01	3 01E+00	2 08E+01	6 27E-01	5 46E+01	4 18E-02	9 42E+00
Xylene (total)#	7 30E+01	5 62E+04	5 49E+05	4 09E+06	3 55E+06	8 52E+04	7 42E+06	6 81E+04	1 54E+07
Zinc	1 10E+01	8 42E+03	8 23E+04	6 13E+05	5 32E+05	1 28E+04	1 11E+06	1 02E+04	2 30E+06
	-	-	-	-	-	-	-	-	-
Nitrate	5 84E+01	4 49E+04	4 39E+05	3 27E+06	2 84E+06	6 81E+04	5 93E+06	5 45E+04	1 23E+07
Nitrite	3 65E+00	2 81E+03	2 74E+04	2 04E+05	1 77E+05	4 26E+03	3 71E+05	3 41E+03	7 68E+05
Sulfide	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
Ammonium	-	-	-	-	-	-	-	-	-

PROGRAMMATIC PRELIMINARY RISK-BASED REMEDIATION GOALS FOR RFETS

Target Analyte List Chemical	Residential Groundwater (mg/L)	Residential Surface Water Swimming (mg/L)	Residential Soil (mg/kg)	Office Worker Soil (mg/kg)	Construction Worker Subsurface Soil (mg/kg)	Wading Ecological Worker (mg/L)	Soil Ecological Worker (mg/kg)	Open Space Surface Water (mg/L)	Open Space Soil/Sediment (mg/kg)
Bicarbonate	-	-	-	-	-	-	-	-	-
Bromide	-	-	-	-	-	-	-	-	-
Carbonate	-	-	-	-	-	-	-	-	-
Chloride	-	-	-	-	-	-	-	-	-
Fluoride	2 19E+00	1 68E+03	1 65E+04	1 23E+05	1 06E+05	2 55E+03	2 22E+05	2 04E+03	4 61E+05
Orthophosphate	-	-	-	-	-	-	-	-	-
Silica (as Si and SiOšd2›)	-	-	-	-	-	-	-	-	-
Sulfate	-	-	-	-	-	-	-	-	-
	(pCi/L)	(pCi/L)	(pCi/g)	(pCi/g)	(pCi/g)	(pCi/L)	(pCi/g)	(pCi/L)	(pCi/g)
Americium-241	1 45E-01	1 12E+02	1 90E+00	7 67E+00	1 64E+02	2 03E+03	1 10E+02	1 36E+02	2 36E+01
Cesium-137+D	1 51E+00	1 16E+03	1 99E-02	7 97E-02	1 59E+00	2 11E+04	6 38E-01	1 41E+03	7 97E-02
Plutonium-239	≥1 51E-01›	1 16E+02	2 50E+00	1 01E+01	2 19E+02	2 11E+03	1 83E+02	≥1 41E+02	6 98E+01
Plutonium-240	1 51E-01	1 16E+02	2 51E+00	1 01E+01	2 20E+02	2 12E+03	1 83E+02	1 41E+02	6 98E+01
Radium-226+D	1 61E-01	1 24E+02	6 17E-03	2 47E-02	4 94E-01	2 25E+03	1 98E-01	1 50E+02	2 47E-02
Radium-228+D	1 92E-01	1 48E+02	1 27E-02	5 06E-02	1 01E+00	2 69E+03	4 06E-01	1 79E+02	5 08E-02
Strontium-89	4 62E+00	3 56E+03	3 86E+01	1 55E+02	3 23E+03	6 47E+04	1 72E+03	4 31E+03	2 71E+02
Strontium-90+D	8 52E-01	6 55E+02	1 42E+01	5 72E+01	1 24E+03	1 19E+04	1 04E+03	7 95E+02	3 98E+02
Tritium	6 66E+02	5 12E+05	1 11E+04	4 48E+04	9 71E+05	9 32E+06	8 12E+05	6 22E+05	3 11E+05
Uranium-233+D	2 98E+00	2 29E+03	4 47E+01	1 82E+02	4 08E+03	4 17E+04	3 15E+03	2 78E+03	9 97E+02
Uranium-234)	1 07E+00	8 25E+02	1 75E+01	7 08E+01	1 55E+03	1 50E+04	1 27E+03	1 00E+03	4 67E+02
Uranium-235+D	1 01E+00	7 79E+02	1 56E-01	6 23E-01	1 25E+01	1 42E+04	5 01E+00	9 46E+02	6 28E-01
Uranium-238+D	7 68E-01	5 91E+02	7 47E-01	2 99E+00	6 01E+01	1 08E+04	2 47E+01	7 17E+02	3 15E+00

= Chemicals listed are volatile

p= The PPRG is set to Csat, if t ncentration is greater than Csat

All toxicity values used in calcul RIS, February 1994, from HEAST, 1994, or approved by the EAOC